

# MINERALOGICAL ABSTRACTS

(Vol. 7, No. 5, March, 1939.)

## Notices of Books.

EDENBERGER (E.). *Angewandte Kristallstrukturlehre. Ein Hilfsbuch zur Bestimmung von Kristallstrukturen.* Berlin (Borntraeger), 1938, xii+208 pp., 88 figs. Price RM. 12 (bound RM. 13.50).

A useful introduction and key to the 'International tables for the determination of crystal structures' published in 1935 [M.A.7-145]. The student will find here a formal development of what is already implicit in the published works of the Bragg school. Particularly clear explanations are given of symmetry-elements of space-groups, and the method of description of a crystal-structure in the 'Strukturbericht' [7-79] is explained in detail. A section on the derivation of structure-factors deserves notice, and the more novel topic of the conditions of formation of forbidden diffractions by 'Umweganregungen' is briefly treated. The inclusion of a critical account of parameter determination by Fourier methods would greatly increase the value of the book to research workers.

F. A. B.

LAKE (S.) & KEYS (D. A.). *Applied geophysics in the search for minerals.* Second edition, Cambridge (University Press), 1938, xi+316 pp., 122 figs. Price 16s.

Except for a new chapter on 'Recent advances' (pp. 274-293, 10 figs.), the edition is practically a reprint of the second edition of 1933 [M.A.10]. In the main text there are only a few minor modifications, the most important being in the account of the leap-frog electrical method. The new chapter has been dealt with as a reprint is shown by the wrong number of the figures following the new chapter. The fact that the present edition has been so soon sold out proves that this text-book is useful in a rapidly advancing branch of practical science. L. J. S.

YAMAGUCHI (S.). *Japanese minerals in pictures.* Tokyo, 1937, vol. 1, xiv+222 pp., 27 pls., 113 text-figs. Japanese, with separate Key (22 pp.) in English.

The text of this handsome and well-illustrated volume is printed in large, clear characters. It is the first of four volumes on systematic mineralogy and includes in systematic order the species from graphite to tellurite. The English summary gives descriptions of the excellent illustrations (many of them in colour) and the text-figures showing drawings

of crystals, together with a brief account of each mineral and localities where found. An appendix (pp. 121-146) by T. Sudo with the crystallography of chalcopyrite from Arakawa mine, A in which tables of crystal-forms, combinations of forms, and angles presented in Arabic numerals. L. J.

PABST (Adolf). *Minerals of California*. Bull. State Division of M California, 1938, no. 113, 344 pp.

A [second] edition of 'Minerals of California' by A. S. Eakle [18 1931] appeared in 1923 [M.A. 3-29]. The present [third] edition revision on the same lines. W. P. Blake in 1866 listed 75 min species found in California; the number has now been increased to 400, of which 54 were first discovered in this State. A brief descrip of each species with simple chemical tests is followed by notes on occurrence in each county, quoting chemical analyses and the ind of crystal-forms that have been recorded. These indices are, howe meaningless without any statement of the axes and axial ratios to wh they are referred. A bibliography under authors includes more t 500 papers. In this, as in previous editions, an index of localities w have added much to the usefulness of the volume. L. J.

TONGEREN (W. van). *Contributions to the knowledge of the chemical c position of the earth's crust in the East Indian Archipelago. I. spectrographic determination of the elements according to arc meth in the range 3600-5000 Å. II. On the occurrence of rarer element the Netherlands East Indies*. Amsterdam (D. B. Centen), 19 xi+181 pp., 14 figs. [London agents, H. K. Lewis & Co.] P 4.50 fl. = 11s. (Part I separately, 3 fl. = 7s.)

Part I (pp. 1-119) gives a short account of the apparatus and met [M.A. 6-291, 481], followed by details for the several elements a useful index of lines 3600-5000 Å. Part II gives the results obtained 299 samples of rocks and minerals from various localities. The aver are: SrO 0.053, BaO 0.074, Sc<sub>2</sub>O<sub>3</sub> 0.00042, Yt<sub>2</sub>O<sub>3</sub> 0.0022, La<sub>2</sub>O<sub>3</sub> 0.0 Ce<sub>2</sub>O<sub>3</sub> 0.0029, Pr<sub>2</sub>O<sub>3</sub> 0.0007, Nd<sub>2</sub>O<sub>3</sub> 0.0021, Yb<sub>2</sub>O<sub>3</sub> 0.0003, Ga<sub>2</sub>O<sub>3</sub> 0.0 TiO<sub>2</sub> 0.8 ca., ZrO<sub>2</sub> 0.023, V<sub>2</sub>O<sub>5</sub> 0.03, Cr<sub>2</sub>O<sub>3</sub> 0.077, MnO 0.29, NiO 0. CoO 0.005. L. J.

DAVISON (E. H.). *Field determination of rocks*. London (Chapma Hall), 1938, viii+87 pp., 10 pls., 4 text-figs. Price 7s. 6d.

This is a brief and concise introduction to petrology for the us prospectors, field geologists, and elementary students. Prelimi



include hints on field work, rock-forming minerals, and the forms of igneous rocks. The different types of igneous, sedimentary, and metamorphic rocks are then clearly described. Although rocks of course, be first studied in the field, the underlying influence of microscopic petrography is always felt, and in the present volume of the rock types mentioned could surely not be determined in specimens alone. There is some confusion in the terms holocrystalline, hemicrystalline, and microcrystalline: we read that 'granite-series . . . are not holocrystalline'. A future edition, which will no doubt be called for, could be improved by editorial revision.

L. J. S.

(A. W.). *Manganese*. Reports on the mineral industry of the British Empire and foreign countries. Mineral Resources Dept., Imperial Institute, London, 1938, 2nd edition, 164 pp., 1 fig. Price 3s. 6d.

is on the same lines as the first edition of 1921, but it has been revised. For example, the account of occurrences of manganese ore on the Gold Coast is extended from two to six pages. Full details are given of the occurrence and production in different countries, for each of which a bibliography is added.

L. J. S.

### New Minerals.

Ефремов (Н. Е.)] Ефремов (Н. Е.). К изучению серпентинитового пояса северного Кавказа.—ЕФРЕМОВ (N. E.). *On the study of the serpentinite belt in the north Caucasus*. Изв. Акад. Наук СССР, Мат. Ест., Сер. Геол. (Bull. Acad. Sci. URSS, Cl. Sci. Math. Nat., Sér. Géol.), 1938, pp. 107–132, 1 pl., 2 text-figs. (Russian with English summary.)

Continuous outcrops of serpentinite and associated rocks are situated in a zone about 500 km. in length stretching along the northern part of the main Caucasian chain. It is suggested that the serpentinites were derived from an aposaxonic magma. Some eighty mineral species were recorded from the serpentinites, some of which are new [M.A. 5–486; 1940; 7–9, 162, 170]. The minerals of the serpentine group show great variability in their chemical composition. On one side they show a transition to talc and on the other to *hydroforsterite* [M.A. 6–490]. The analysis of a new variety of serpentine from the Malka region gave:  $\text{SiO}_2$  58.8,  $\text{Al}_2\text{O}_3$  2.70,  $\text{Fe}_2\text{O}_3$  1.84,  $\text{FeO}$  0.24,  $\text{MnO}$  trace,  $\text{MgO}$  41.02,  $\text{H}_2\text{O} +$  15.96,  $\text{H}_2\text{O} -$  1.64 = 100.28, corresponding to

$H_{46}Mg_{26}Si_{16}O_{81}$ . The thermal curve shows an endothermal effect at 400° C. and this suggests the presence of the brucite structure unit cell. Altogether 19 analyses of serpentine and serpentinite are given. S. 1

[GERASIMOVSKY (V. I.)] Герасимовский (В. И.). Чинглусуит—минерал.—GERASIMOVSKY (V. I.). *Tchingslusuite—a new mineral*. Изв. Акад. Наук СССР, Отд. Мат. Ест., Сер. Геол. (Bull. Sci. URSS, Cl. Sci. Math. Nat., Sér. Géol.), 1938, pp. 15-16, 1 fig. (Russian with English summary.)

Chinglusuite is a new mineral of the group of titano-silicates and was found in pegmatite veins intruded into the sodalite-syenite of the Chinglusuai (Чинглусуай), Lovozero tundra, Kola peninsula. It is associated with microcline, murmanite, hackmanite, eudialyte, laumontite, phyllite, ramsayite, aegirine, and arfvedsonite, and was apparently formed during the later stages of the pegmatite phase. Analyzed by T. A. Burova gave  $SiO_2$  39.50,  $TiO_2$  9.62,  $ZrO_2$  3.02, rare-earth oxides 0.06,  $Fe_2O_3$  2.84,  $MnO$  14.53,  $MgO$  nil,  $CaO$  1.75,  $SrO$  nil,  $K_2O$  0.41,  $Cl$  0.12,  $P$  trace,  $F$  nil,  $H_2O +$  7.92,  $H_2O -$  13.92 = 0.02 = 100.37, corresponding to the formula  $2(Na,K)_2O \cdot 5(Mn,Zr,Ti)_2O_3 \cdot 14SiO_2 \cdot 9H_2O$ . It is an amorphous (metamict) mineral with black colour, pale yellow in thin section,  $n$  1.582,  $H$ . 2-3, sp. gr. 4.0, fuses easily to dark glass, soluble in cold  $HCl$ , in hot  $HNO_3$ , and with difficulty in hot  $H_2SO_4$ . S. 1

SCHALLER (Waldemar T.). *Johannsenite, a new manganese pyroxene*. Amer. Min., 1938, vol. 23, pp. 575-582, 1 fig.

A preliminary account appeared in 1933 [Min. Mag. 23-631]. The new mineral,  $MnCaSi_2O_6$ , shows the same X-ray pattern as diopside ( $MgCaSi_2O_6$ ) and hedenbergite ( $FeCaSi_2O_6$ ), with which it is isomorphous. It occurs as brown to green columns, radiating prismatic spherulitic aggregates in quartz or calcite veins in rhyolite and in calcareous metamorphic limestone at several localities. Monoclinic with good cleavage and  $c, a, b$  partings; optic axial plane (010), extinction-angle  $2V$  70°, positive. The following analyses arranged in order of the percentage (97-51) of  $MnCaSi_2O_6$ : I, Schio, Venetia, Italy ( $\alpha$  1.710,  $\beta$  1.738); II and III, Tetela de Ocampo, Puebla, Mexico; IV, Hualar, New Mexico ( $\alpha$  1.713,  $\beta$  1.721,  $\gamma$  1.740); V, Bohemia mining district, Lane Co., Oregon; VI, Schio, Venetia ( $\alpha$  1.708,  $\beta$  1.718,  $\gamma$  1.737); VII, Franklin Furnace, New Jersey ( $\alpha$  1.697,  $\beta$  1.706,  $\gamma$  1.725). Some pyroxene

es of calcium-rich rhodonites represent mixtures of rhodonite and janssenite; and manganhedenbergites are isomorphous mixtures of hedenbergite and johannsenite. The original bustamite (A. Brongniart, from Puebla, Mexico, is a mixture of johannsenite and rhodonite, bustamite from Franklin Furnace [M.A. 2-362] is a distinct species dimorphous with johannsenite. At about 830° C. janssenite inverts to bustamite.

CO <sub>2</sub> .	Al <sub>2</sub> O <sub>3</sub> .	Fe <sub>2</sub> O <sub>3</sub> .	FeO.	MnO.	MgO.	CaO.	CO <sub>2</sub> .	H <sub>2</sub> O+.	H <sub>2</sub> O—.	Total.
8.16	—	—	0.50	27.82	0.23	20.56	1.02	0.58	0.55	99.87
7.62	0.91	0.04	0.70	27.47	0.53	22.18	0.24	0.40	0.09	100.18
6.24	0.32	0.25	0.88	29.94	0.26	18.16	—	0.49	0.15	100.69
5.15	0.31	1.58	4.28	21.37	0.48	20.88	1.39	0.96	0.24	99.81
2.84	—	0.59	3.20	23.61	2.06	20.99	3.86	1.57	0.58	100.07
7.62	0.81	0.62	4.31	21.15	2.74	20.15	2.07	0.25	0.19	100.16
9.30	—	—	2.59	14.85	6.19	22.97	—	—	—	100.17

to ZnS 0.34, MnO<sub>2</sub> 0.11. IV, also ZnS 0.17. V, also ZnS 0.77. VI, also ZnS 0.11. VII, also ZnO 3.27.

L. J. S.

(Mark C.). *Mineralogy of three sulphate deposits of northern Chile*. Amer. Min., 1938, vol. 23, pp. 669-760, 7 figs.

Details are given of the geology and history of mining at Chuquibambilla, Quetena, and Alcaparrosa, all near Calama in prov. Antofagasta. The sulphates have been derived by the oxidation of pyrite, and also enargite at Chuquibambilla; and their paragenesis, order of formation, and conditions of formation are discussed. Descriptions of minerals include new crystallographic, optical, X-ray, and chemical data for several species. New minerals recently collected by the author are antofagastite, bandylite, leightonite [M.A. 7-59], lindgrenite [M.A. 7-147], ungemachite, and elino-ungemachite [M.A. 7-123]; others are metasideronatrite from Chuquibambilla is a partly dehydrated sideronatrite; it is yellow, fibrous, orthorhombic,  $a:b:c = 1.0:1.187$ ; cleavage (100) (010) perfect, (001) good;  $\alpha$  1.543,  $\gamma$  1.634,  $2V$  60°, positive; analysis I by E. P. Henderson,  $\text{Na}_4\text{Fe}_2(\text{SO}_4)_4(\text{OH})_2$ . *Parabutlerite* is dimorphous with butlerite (not orthorhombic) [M.A. 4-11] and is found at all three localities as an orange-coloured alteration product of copiapite; it is orthorhombic,  $a:b:c = 0.7310:1.0:0.7218$ ;  $\alpha$  1.598,  $\beta$  1.663,  $\gamma$  1.737,  $2V$  60°, positive; anal. II,  $\text{Fe}(\text{SO}_4)(\text{OH}) \cdot 2\text{H}_2\text{O}$ . *Metahohmannite*,  $\text{Fe}_2(\text{SO}_4)_3 \cdot 3\text{H}_2\text{O}$ , orange-coloured powder resulting by the partial decomposition of hohmannite. *Cuprocopiapite*, anal. III, by F. A. J.  $\beta$  1.591. New crystallographic data are given for szomolnokite,



pickeringite, rhomboclase, botryogen (anal. IV), lapparentite, and jarosite, and X-ray data for pickeringite (anal. V) and halotrichite (anal. VI).

	SO <sub>3</sub> .	Fe <sub>2</sub> O <sub>3</sub> .	Al <sub>2</sub> O <sub>3</sub> .	CuO.	MgO.	Na <sub>2</sub> O.	K <sub>2</sub> O.	H <sub>2</sub> O.	Insol.	Total.	S
I.	48.66	22.90	—	—	—	17.56	0.26	9.75	0.60	99.73	2
II.	39.15	39.21	—	—	—	—	—	22.00	0.23	100.59	
III.	41.62	27.66	1.47	5.72	—	—	—	23.51	0.21	100.19	
IV.	39.48	19.81	—	—	9.95	—	—	30.76	—	100.00	2
V.	37.84	—	12.30	—	4.35	—	—	44.66	0.50	99.74	1
VI.	37.28	0.65	10.26	0.66	—	—	—	43.33	0.93	100.39	1

V, also CaO 0.09. VI, also FeO 7.28.

L. J. S.

HURLBUT (Cornelius S., Jr.). *Parahilgardite, a new triclinic mineral*. Amer. Min., 1938, vol. 23, pp. 765–771, 4 figs.

Colourless crystals devoid of any parallel planes and with a piezoelectric axis occur in pairs (right-handed and left-handed) in regular growth on crystals of hilgardite from Choctaw salt dome, Louisiana [M.A. 7–14]. Except for an optical extinction of 20° on (001) and doubling of the *b*-axis (*a* 11.24, *b* 22.28, *c* 6.20 Å.; *a*:*b*:*c* = 0.504:0.2783,  $\alpha$  90° 0',  $\beta$  90° 0',  $\gamma$  91° 12') all the characters are identical with those of hilgardite. Analysis by F. A. Gonyer, B<sub>2</sub>O<sub>3</sub> 48.97, Cl 10.10, CaO 34.23, H<sub>2</sub>O 6.07, insol. 2.21, total (less O for Cl) 99.62, also gave the same formula, Ca<sub>8</sub>B<sub>18</sub>O<sub>33</sub>Cl<sub>4</sub>·4H<sub>2</sub>O, but with two molecules in the unit cell. Except for the doubtful case of axinite, this is the only mineral representative of this crystal-class.

L. J.

BERMAN (Harry) & HARCOURT (G. A.). *Natural amalgams*. Amer. Min., 1938, vol. 23, pp. 761–764, 1 fig.

Silver-amalgam in the  $\alpha$ -phase (face-centred cubic, *a* 4.077–4.17 Å., with Hg up to 45%) is described as mercurial silver with the various names arquerite, kongsbergite, and bordosite. The  $\gamma$ -phase (body-centred cubic) is found as good crystals at Moschellandsberg, Rhineland-Palatinate, Bavaria, and is named *moschellandsbergite*. This is brittle and easily powdered, H. 3½; analysis by F. A. Gonyer gave Ag 27.04, Hg 72.96, sp. gr. 13.48. The unit cell, *a* 10.1 Å., contains 10(Ag<sub>2</sub>Hg<sub>3</sub>). The  $\beta$ -phase of silver-amalgam (close-packed hexagonal, Hg 60%) has not been found as a mineral. Other native amalgams are gold-amalgam (calaverite), palladium-amalgam (potarite, Min. Mag. 21–397).

L. J.

LARSEN (Esper S., 3rd). *Overite, a new mineral from Fairfield, Utah*. Amer. Min., 1938, vol. 23, no. 12, pt. 2, p. 9. (Abstract.)

Pale green to colourless prismatic crystals in variscite nodules

$= 0.7839:1:0.3794$ , sp. gr. 2.53, H. 4,  $\alpha$  1.568,  $\beta$  1.574,  $\gamma$  1.580, negative. The unit cell,  $a$  14.62,  $b$  18.68,  $c$  7.08 Å., contains  $16(\text{PO}_4)_8 \cdot 20\text{H}_2\text{O}$ .  
L. J. S.

Richard). *Weberite, a new mineral from Ivigtut*. Meddel. om Grønland, 1938, vol. 119, no. 7, 11 pp., 1 pl., 2 text-figs.

It occurs sparingly as pale-grey grains in the Greenland cryolite, being less soluble in boiling  $\text{AlCl}_3$  solution than the cryolite, it was detected in the insoluble residue together with fluorite, topaz, and mica. Sp. gr. 2.96, H.  $3\frac{1}{2}$ . Monoclinic with optic axial plane perpendicular to plane of symmetry and two cleavages perpendicular to this;  $\alpha$  1.348,  $\beta$  1.348,  $\gamma$  1.350,  $2V$   $83^\circ$ , positive. Analysis by H. Buchwald, 55, Fe 0.37, Mg 10.43, Ca 0.08, Na 19.08, K 1.19, F 57.58, insol. 100.54, agrees with  $\text{Na}_2\text{MgAlF}_7$ .  
L. J. S.

Shin). *Abukumalite, a new yttrium mineral*. Sci. Papers Inst. Chem. Research, Tokyo, 1938, vol. 34, pp. 1018–1023.

It occurs in pegmatite at Iisaka, Abukuma range, Fukushima Prefecture, Japan, as dark reddish-brown masses, rarely as hexagonal prisms with imperfect  $c$  and  $m$  cleavage. Sp. gr. 4.35, H. 6, brittle,  $\rho$  4.1,  $\epsilon$  1.752. X-ray measurements gave  $a$  5.7 Å.,  $a:c = 1:0.7$ . Analysis,  $\text{SiO}_2$  20.84,  $\text{P}_2\text{O}_5$  5.84, Yt earths 45.98, Ce earths 6.45,  $\text{ThO}_2$  0.10,  $\text{CaO}$  13.53,  $\text{Al}_2\text{O}_3$  1.05,  $\text{Fe}_2\text{O}_3$  2.10,  $\text{MnO}$  1.13,  $\text{MgO}$  0.22,  $\text{H}_2\text{O} + \text{CO}_2$  0.16,  $\text{CO}_2$  0.08, F 0.45 = 99.30. The atomic weight 112 for the rare-earths indicates the presence also of Gd, Dy, Er, &c. The mineral is a phospho-orthosilicate  $\text{CaYt}_2(\text{Si,P})_2\text{O}_8$ , isomorphous with cerite with yttrium in place of cerium.  
L. J. S.

(J.). *La sharpite, nouveau carbonate d'uranyle du Congo belge*. Bull. Séan. Inst. Roy. Colon. Belge, 1938, vol. 9, pp. 333–336.

Sharpite forms yellowish-green, radially fibrous crusts on curite and melinite from Shinkolobwe, Katanga. The fibres have straight optical axes with positive elongation and are probably orthorhombic and optically positive;  $\alpha$  1.633,  $\gamma$  near 1.72. Analysis of material dried at  $100^\circ\text{C}$ . gave  $\text{UO}_3$  81.04,  $\text{CO}_2$  10.30,  $\text{H}_2\text{O}$  6.81,  $\text{CaO}$  2.70 = 100.85. Weight lost at  $200\text{--}275^\circ\text{C}$ .; the loss at  $325^\circ$  is 16.85%, and on ignition 100%. Formula,  $6\text{UO}_3 \cdot 5\text{CO}_2 \cdot 8\text{H}_2\text{O}$ . The mineral may be regarded as a rutherfordine.  
L. J. S.

Carlo). *Cuprorivaite: un nuovo minerale*. Periodico Min. Ital., 1938, vol. 9, pp. 333–345.

Material from the Cuprorivaite mine, near Montebelluna, examined shows small blue, colourless (quartz),

and green grains with some gypsum in a white powdery matrix of quartz. The blue grains have sp. gr. 2.866,  $\alpha$  1.589,  $\beta$  1.627,  $2V$   $34^\circ 14'$ , negative, and analysis gave (after deducting an estimated amount of 33% quartz)  $SiO_2$  62.51,  $Al_2O_3$  2.95,  $Fe_2O_3$  0.34,  $CuO$  16.23,  $CaO$  11.98,  $K_2O$  2.55,  $K_2O$  1.00,  $H_2O$  2.43, from which the formula is deduced  $2(Ca,Na)(Cu,Al)(Si,Al)_4(O,OH)_{10} \cdot H_2O$ . This seems to be related to rivaite  $[(Ca,Na_2)Si_2O_5]$ . Analysis is also given of an impure separate of the green grains, which seem to be an alteration product of cuprorivaite. L. J.

BILLIET (V.) & VANDENDRIESSCHE (A). *Sur l'hydroténorite; son identité avec la ténorite*. Bull. Soc. Belge Géol., 1938, vol. 48, pp. 333-347, 1 pl.

The original hydroténorite from Étoile du Congo mine, Katanga [M.A. 7-10], both in the natural state and after heating up to 850°C. has the same X-ray pattern as ténorite from Likasi, Katanga, and agrees with previous determinations for ténorite [M.A. 6-174]. V. is present as admixed chrysocolla and adsorbed. L. J.

DE LEENHEER (L.). *Examen chalcographique de l'hydroténorite et de la ténorite*. Bull. Soc. Belge Géol., 1938, vol. 48, pp. 343-347, 1 pl.

Examined in reflected polarized light, hydroténorite [M.A. 7-10] is anisotropic and pleochroic, and, like massive ténorite, consists of a mixture of  $CuO$ , chrysocolla, and malachite with adsorbed water. L. J.

KOŁACZKOWSKA (Maria). *Czakaltait, nowy mineral boliwijski.—caltaïte, un nouveau minéral de Bolivie*. Spraw. Tow. Nauk. Warszaw. (Compt. Rend. Soc. Sci. Varsovie), Cl. III, 1936, vol. 1, pp. 71-73. (Polish and French.)

The 'pinité' from Chacaltaya, Bolivia, described by Thugutt [M.A. 473], has not the characters of a pseudomorph and it is remarkable in absorbing 8%  $H_2O$  from the air when powdered. The X-ray pattern shows more lines and a larger unit cell than either pinité or muscovite. L. J.

### X-rays and Crystal-structure.

[BOLDYREV (A. K.) & others]. Болдырев (А. К.) асс. Михеев (В. И.), Ковалев (Г. А.), Дубинина (В. Н.) . . . Рентгенометрический определитель минералов. Часть I.—*X-ray determinative tables*.



minerals. Part I. Зап. Ленинград. Горн. Инст. (Ann. Inst. Mines, Leningrad), 1938, vol. 11, pt. 2, pp. 1-157, 3 figs.

Explanation of the method is translated in full into English (pp. 48-49) and the tables are given in both Russian and English. The latter (pp. 49-64) gives the values  $d/n$  of lines in X-ray powder patterns from 7.384 to 1.029, with intensities (1-10) and reference to the main table. The latter (pp. 65-151) gives details of the patterns for a large number of minerals, including many new variations.

L. J. S.

WALT (J. D.), RINN (H. W.), & FREVEL (L. K.). *Chemical analysis by X-ray diffraction. Classification and use of X-ray diffraction patterns*. Indust. & Eng. Chem., 1938, vol. 30 (analytical edition, vol. 10), pp. 457-512, 3 figs.

Measurements and relative intensities of powder photographs of a thousand chemical compounds are tabulated, using molybdenum  $K\alpha$  radiation and a camera radius 20.32 cm. A system of classification of standard powder patterns is described by which an unknown substance or mixture of substances may be quickly identified. F. A. B.

WILSON (W. L.) & LIPSON (H.). *The employment of contoured graphs of structure-factor in crystal analysis*. Zeits. Krist., 1936, vol. 95, pp. 333-337, 17 figs. [Cf. M.A. 6-404.]

Application of contoured graphs of structure-factor to the determination of crystal-structure, particularly when Fourier methods are described with reproductions of some of the graphs. They permit repeated calculations of structure-factor and permit one to foresee the effect of shifting an atom in a given direction and by a given amount. F. A. B.

WILSON (M. J.). *X-ray surface reflection fields and their application to absorption corrections and to background patterns*. Zeits. Krist., 1938, vol. 99, pp. 189-204, 11 figs.

Diffraction in crystals examined by moving film X-ray methods can be detected for by examining the distribution of surface reflection fields. A diffuse background pattern can be produced by the use of radiation below the absorption edge of one of the elements present in the substance being photographed, and reveals the faces present and their relative sizes. The method can be applied to the goniometry of crystals, faces of which are too small or too imperfect to yield optical measurements. F. A. B.

DAWTON (Ralph H. V. M.). *The integration of large numbers of 2 crystal reflections*. Proc. Physical Soc. London, 1938, vol. 5, pp. 919-925, 8 figs.

It is possible to measure the relative intensities of X-ray diffraction by making a positive of the X-ray film and then measuring the transmitted through the positive from a small projector lamp with a Weston photronic cell. The accuracy obtainable is sufficient for crystal structure analysis. Data are given for both Ilford and Kodak X-ray films. F. A.

SCHÄFER (K.). *Quantitative Kristallit-Röntgenanalyse*. Zeits. Krist., 1938, vol. 99, pp. 142-152.

The proportions in which two crystalline materials occur in a mixture of their powders can be determined by measurement of the intensities of the lines in an X-ray photograph. The method was tested on a mixture of NaCl and KBr and on a mixture of  $\text{CuAl}_2$  and Al. H.

TRILLAT (J. J.) & OKETANI (S.). *Étude de la structure du soufre par le moyen des rayons cathodiques*. Zeits. Krist., 1937, vol. 98, pp. 343, 14 figs.

An investigation was made of the structure of thin films of sulphur obtained by evaporation of a drop of  $\text{CS}_2$  containing sulphur in solution on the surface of water carefully purified. The unit cell obtained was orthorhombic with  $a$  5.2,  $b$  6.4,  $c$  12.2 Å. as found previously by B. The three-dimensional lattice was transformed into a two-dimensional net as the film evaporated, but no trace of a monoclinic structure was seen. H.

HUME-ROTHERY (William) & REYNOLDS (Peter William). *A study of the temperature Debye-Scherrer camera, and its application to the determination of the lattice spacing of silver*. Proc. Roy. Soc. London, Ser. A, 1937, vol. 167, pp. 25-34, 3 figs.

A water-cooled electric furnace built in a cylindrical camera gave pure silver  $a$  4.1656 at 943° C. and  $a$  4.0774 at 20° C. L. J.

MONTORO (Vincenzo). *Studio sulla orientazione preferenziale delle cristalliti nella varietà filiforme di argento nativo*. Periodico Min. Roma, 1937, vol. 9, pp. 55-59, 2 figs.

X-ray examination of wire silver from several localities shows elongation to be near [110] and the edge of the unit cell  $a$  4.0770-4.0774 at 20° C. L. J.

(C. T.). *The size and arrangement of bismuth microcrystals formed from vapor*. Physical Review (Amer. Phys. Soc.), 1935, vol. 48, pp. 193–198, 5 figs.

Magnetic and X-ray study of thin films of bismuth deposited on mica show that all the films have a fibre structure with (111) planes of the individual crystals parallel to the plane of the backing. It was found that all films of thickness 0.1 to  $4\ \mu$  ( $1$  to  $40 \times 10^{-5}$  cm.) are infinitely crystalline.

F. A. B.

(Endel) & PERLITZ (Harald). *Neubestimmung der Gitterkonstante von Natrium*. Zeits. Krist., 1938, vol. 100, pp. 195–200, 2 figs.

Sodium has a cubic unit cell containing two atoms of Na and having an edge length of  $4.282\ \text{\AA}$ .

H. S.

(Endel) & ARUJA (Harald). *Die Struktur der intermetallischen Verbindung  $\text{NaAu}_2$* . Zeits. Krist., 1938, vol. 100, pp. 157–166, 3 figs.

The cubic unit cell of  $\text{NaAu}_2$  contains eight molecules and has an edge length of  $7.72\ \text{\AA}$ . The unit cell of pure gold has an edge length of  $4.0700$  at  $20^\circ\text{C}$ .

H. S.

FRANK (A. J.), JAY (A. H.), & TAYLOR (A.). *The lattice spacing of iron-nickel alloys*. Phil. Mag. London, 1937, ser. 7, vol. 23, pp. 545–557, 3 figs.

Slowly cooled body-centred iron has  $a = 2.8605\ \text{\AA}$ , increasing to  $2.8615\ \text{\AA}$  with 5.7 at. % Ni, and then falling to  $2.8635\ \text{\AA}$  in the two-phase region (5.7–28 at. % Ni). Face-centred nickel has  $a = 3.5169\ \text{\AA}$ , increasing to  $3.5178\ \text{\AA}$  with 38.69 at. % Ni, and falling to  $3.5412\ \text{\AA}$  in the two-phase region.

L. J. S.

FRANK (A. J.), JAY (A. H.), & TAYLOR (A.). *The lattice spacing of iron-nickel alloys*. Phil. Mag. London, 1937, ser. 7, vol. 23, pp. 545–557, 3 figs.

FRANK (A. J.), JAY (A. H.), & TAYLOR (A.). *The lattice spacing of iron-nickel alloys*. Phil. Mag. London, 1937, ser. 7, vol. 23, pp. 545–557, 3 figs.

FRANK (A. J.), JAY (A. H.), & TAYLOR (A.). *The lattice spacing of iron-nickel alloys*. Phil. Mag. London, 1937, ser. 7, vol. 23, pp. 545–557, 3 figs.

FRANK (A. J.), JAY (A. H.), & TAYLOR (A.). *The lattice spacing of iron-nickel alloys*. Phil. Mag. London, 1937, ser. 7, vol. 23, pp. 545–557, 3 figs.



surrounded by twelve iron and copper atoms respectively. The abnormally low value thus obtained for the radius of the arsenic atom  $1.10 \text{ \AA}$ , is ascribed to polarization. The mineral domeykite studied by optical and X-ray methods proves to consist chiefly of a body-centred cubic component. The unit cell containing  $16\text{Cu}_3\text{As}$  has  $a 9.592 \text{ \AA}$ ; calculated sp. gr. 7.95. The space-group is  $T_d^6$  and in this structure the arsenic atom is calculated to have the radius  $1.35 \text{ \AA}$ . The structure of cubic  $\text{Cu}_3\text{As}$  has close analogies with that of artificial hexagonal  $\text{Fe}_3\text{P}$  and atomic parameters for the latter have been calculated. The cubic form of  $\text{Cu}_3\text{As}$  passes into the hexagonal form on temperature at  $225^\circ \text{C}$ . with the formation of a second phase identical with algodonite. This phase is hexagonal and the unit cell containing  $2\text{Cu}_3\text{As}$  has dimensions  $a 2.581$ ,  $c 4.220 \text{ \AA}$ . Algodonite is presumed to have the formula  $\text{Cu}_3\text{As}$ . F. A.

AMINOFF (G.) & BROOMÉ (B.). *Über die Oxydation von Zinkblende in Einkristallen, an Hand von Elektroneninterferenzen studiert*. Svenska Vetenskapsakad. Handl., 1938, ser. 3, vol. 16, no. 1, 12 pp., 2 pls., 11 text-figs. [M.A. 6-330.]

NOWACKI (Werner). *Die Kristallstruktur von EuS*. Zeits. Krist., vol. 99, pp. 339-341.

Europium sulphide has the NaCl structure. The unit cell contains four molecules of EuS and has  $a 5.957 \text{ \AA}$ . H.

BARONI (A.) *Sul polimorfismo di MnSe*. Zeits. Krist., 1938, vol. 99, pp. 336-339, 3 figs.

Manganese selenide occurs in three forms: ( $\alpha$ ) with sodium chloride structure having  $a 5.44 \text{ \AA}$ . It is got by precipitating MnSe from sulphuric chloride, or acetate solutions in the cold by means of ammonium selenide in the presence of ammonium acetate. ( $\beta$ ) with zinc-blende structure having  $a 5.82 \text{ \AA}$ . It is got by standing manganese acetate solution in an atmosphere of  $\text{H}_2\text{Se}$ . It is unstable and passes into ( $\alpha$ ). ( $\gamma$ ) with wurtzite structure having  $a 4.12$ ,  $c 6.72 \text{ \AA}$ . It is very unstable, but can be obtained by the action of  $\text{H}_2\text{Se}$  and  $\text{NH}_4\text{Cl}$  vapour on a boiling solution of manganese chloride or sulphate. H.

ELLIOTT (Norman). *The crystal structure of manganese diselenide and manganese ditelluride*. Journ. Amer. Chem. Soc., 1937, vol. 59, pt. 2, pp. 1958-1962, 9 figs.

These are cubic with the pyrite type of structure. For  $\text{MnSe}_2$   $a 6.44 \text{ \AA}$  and for  $\text{MnTe}_2$   $a 6.943 \text{ \AA}$ . L. J.

REN (A.). *Die Kristallstruktur von  $Ni_3S_2$* . Zeits. Anorg. Chem., 1938, vol. 239, pp. 82-84, 1 fig.

$Ni_3S_2$  is rhombohedral, space-group  $D_3^7$ . The unit cell,  $a$  4.041 Å., contains one molecule. [M.A. 3-20.] L. J. S.

WIST (Dick) & WESTGREN (A.). *Röntgenuntersuchung des Systems Co-S*. Zeits. Anorg. Chem., 1938, vol. 239, pp. 85-88.

$CoS$  has  $a$  9.907 Å.  $CoS$  has  $a$  3.367,  $c$  5.177 Å. when saturated with  $S$   $a$  3.361,  $c$  5.160 Å. when saturated with  $S$ .  $Co_3S_4$  is face-centred space-group  $O_h^7$  with 8 mols. in the unit cell,  $a$  9.382 Å.  $CoS_2$  has  $a$  3.361 Å. [M.A. 3-20, 337.] L. J. S.

ER (M. J.). *A systematic method of investigating superstructures, applied to the arsenopyrite crystal structure type*. Zeits. Krist., 1936, vol. 94, pp. 425-438, 1 fig.

found that the crystal-structure of mispickel is so related to that of arsenopyrite that the  $a$ - and  $b$ -axes are doubled and the  $c$ -face centred. Possible distinct superstructures fulfilling these conditions are discussed, all of which are monoclinic. It is concluded that the orthorhombic symmetry of mispickel confirmed by X-ray photographs is due to twinning and this has now been revealed by the examination of polished surfaces of crystals in reflected polarized light. [M.A. 3-20, 337-81.] F. A. B.

Y & GARRIDO (J.). *Sobre la estructura de los sulfotellururos de bismuto*. Anal. Soc. Española Fís. Quím., 1937, vol. 35, pp. 242-248, 1 fig.

GO (J.) & FEO (R.). *Sur les sulfotellurures de bismuth*. Bull. Soc. Chim. Min., 1938, vol. 61, pp. 196-204.

aldymite ( $Bi_2Te_2S$ ) has  $a$  10.2,  $d_{111}$  10.0 Å. [M.A. 6-38]. Grünite ( $Bi_4TeS_3$ ) from Roughten Gill, Cumberland, has a spacing across cleavage of 13.5 Å., and orueteite ( $Bi_8TeS_4$ ) from Spain has 13.3 Å. Measurements of powder photographs are given for joseite ( $Bi_3Te(S, Se)$ ) from Brazil and bismuthinite ( $Bi_2S_3$ ) from Tasna, Bolivia. L. J. S.

ER (J. E.). *Röntgenographische Bestimmungsmethoden und Untersuchung der Bleispiessglanze*. Zeits. Krist., 1938, vol. 100, pp. 128-156.

Orthorhombic unit cell of zinckenite contains eight molecules of  $Pb_2S_4$  and has  $a$  12.29,  $b$  8.66,  $c$  13.76 Å. [Cf. Min. Mag. 25-221.]

Orthorhombic unit cell of meneghinite contains four molecules of  $Pb_2S_4$  and has  $a$  11.70,  $b$  8.25,  $c$  13.70 Å. The orthorhombic unit cell of meneghinite contains two molecules of  $Pb_5Sb_4S_{11}$  and has  $a$  17.88,  $b$  14.83 Å. The monoclinic unit cell of geocronite contains four

molecules of  $\text{Pb}_5\text{SbAsS}_8$  and has  $a$  14.92,  $b$  8.25,  $c$  14.35 Å.,  $\beta$  58° 26' orthorhombic unit cell of jamesonite contains eight molecules  $\text{Pb}_2\text{Sb}_2\text{S}_5$  and has  $a$  16.16,  $b$  8.60,  $c$  13.75 Å. The monoclinic unit cell of plagionite contains three molecules of  $\text{Pb}_5\text{Sb}_{14}\text{S}_{30}$  and has  $a$  16.84,  $b$  16.84,  $c$  13.52 Å.,  $\beta$  72° 45'. The monoclinic unit cell of heteromorphite contains one molecule of  $\text{Pb}_{11}\text{Sb}_{12}\text{S}_{29}$  and has  $a$  11.93,  $b$  8.31,  $c$  14.11 Å.,  $\beta$  73° 30'. H.

LAVAL (Jean). *Sur la diffusion des rayons X par un cristal*. Compt. Rend. Acad. Sci. Paris, 1938, vol. 207, 169–170, 1 fig.

Mainly geometrical. Results are exemplified by a calculation of the diffusing power at various angles to the incident beam of a crystal of sylvine. C. A.

WELLS (A. F.). *The crystal structure of palladous chloride  $\text{PdCl}_2$* . Z. Krist., 1938, vol. 100, pp. 189–194, 2 figs.

Palladous chloride has the space-group  $D_{2h}^{12}$ . The unit cell contains two molecules of  $\text{PdCl}_2$  and has  $a$  3.81,  $b$  3.34,  $c$  11.0 Å. H.

NOWACKI (Werner). *Die Kristallstruktur des kubischen Yttriumfluorids  $\text{YF}_3$* . (Mit einem Anhang von G. BECK und W. NOWACKI.) Z. Krist., 1938, vol. 100, pp. 242–250.

Yttrium fluoride has a cubic unit cell containing three molecules of  $\text{YtF}_3$  with an edge of 5.644 Å. H.

BROSSET (Cyrill). *Die Kristallstruktur des Chioliths*. Zeits. Anorg. Chem., 1938, vol. 238, pp. 201–208, 4 figs.

Chiolite is tetragonal, space-group  $D_{4h}^6$ , with unit cell,  $a$  7.00,  $c$  10.00, containing two molecules  $\text{Na}_5\text{Al}_3\text{F}_{14}$ . The structure is built up of layers of  $\text{AlF}_6$  octahedra and shows a relation to that of  $\text{TlAlF}_4$  and  $\text{Tl}_2\text{F}_6$ . L.

NÁRAY-SZABÓ (István) & SASVÁRI (Kálmán). *A kryolith  $\text{Na}_3\text{AlF}_6$  szerkezete*.—NÁRAY-SZABÓ (St. v.) & SASVÁRI (K.). *Die Struktur des Kryoliths  $\text{Na}_3\text{AlF}_6$* . Mat. Term.-tud. Értesítő, Budapest, vol. 57, pp. 664–671, 1 fig. (Hungarian with German summary). NÁRAY-SZABÓ (St. v.) & SASVÁRI (K.). *Die Struktur des Kryoliths  $\text{Na}_3\text{AlF}_6$* . Zeits. Krist., 1938, vol. 99, pp. 27–31, 1 fig.

The space-group of cryolite is  $C_{2h}^5 = P2_1/n$ . The unit cell has  $a$  5.61,  $b$  5.61,  $c$  7.80 Å.,  $\beta$  89° 49', and contains two molecules  $\text{Na}_3\text{AlF}_6$ . The structure deduced by Menzer [M.A. 4–362] is erroneous. V.



ELLO (Antonio). *Ricerche sulla struttura cristallina della nocerite*. Periodico Min. Roma, 1938, vol. 9, pp. 229–248, 2 pls., 2 text-figs. Nocerite [M.A. 1–106] has a unit cell  $a$  8.84,  $c$  3.12 Å. containing three molecules  $\text{Ca}_3\text{Mg}_3\text{O}_2\text{F}_8$ ; the space-group is  $C_6^1$ , or  $C_{6h}^1$ . L. J. S.

RY (Rose C. L.). *The crystal structure of ammonium chlorobromiodide and the configuration of the chlorobromiodide group*. Zeits. Krist., 1937, vol. 98, pp. 324–333, 2 figs.

Space-group of ammonium chlorobromiodide is  $V_h^{16}$ . The unit cell contains four molecules of  $\text{NH}_4\text{BrICl}$ , and has  $a$  6.13,  $b$  8.50,  $c$  9.94 Å.

H. S.

RY (Rose C. L.). *The configuration of a penthalogen anion group from the X-ray structure determination of potassium tetra-chloriodide crystals*. Zeits. Krist., 1938, vol. 98, pp. 377–393, 5 figs.

Potassium tetrachlor-iodide has the space-group  $C_{2h}^5$ . The unit cell contains four molecules of  $\text{KICl}_4$  and has  $a$  13.09,  $b$  14.18,  $c$  4.20 Å.

Each iodine atom is at the centre of a square with semi-diagonal 2.34 Å. with a chlorine atom at each vertex.

H. S.

EN (E. J.). *The crystal structure of  $\text{NH}_4\text{HgCl}_3$* . Zeits. Krist., 1938, vol. 100, pp. 208–211, 1 fig.

Orthorhombic unit cell contains one molecule and has  $a$  4.19,  $c$  7.94 Å.

H. S.

LIVRAY (C. H.), WILDE (J. H. de), & BIJVOET (J. M.). *The crystal structure of  $\text{K}_2\text{HgCl}_4 \cdot \text{H}_2\text{O}$* . Zeits. Krist., 1938, vol. 100, pp. 212–220, 5 figs.

Orthorhombic unit cell of  $\text{K}_2\text{HgCl}_4 \cdot \text{H}_2\text{O}$  contains four molecules and has  $a$  8.27,  $b$  11.63,  $c$  8.89 Å. The space-group is  $Pbam$ .

H. S.

EL (H. J.) & BIJVOET (J. M.). *Die Kristallstruktur von NaCN*. Zeits. Krist., 1938, vol. 100, pp. 201–207, 2 figs.

Rhombohedral modification of sodium cyanide, whose unit cell has  $a$  5.87 Å., transforms at about 15° C. into an orthorhombic modification whose unit cell contains two molecules of NaCN and has  $a$  3.74,  $b$  4.71,  $c$  5.61 Å.

H. S.

HEIN (G.) & NOWOTNY (H.). *Die Kristallstruktur von Bromo-mercuraten  $\text{A}_2\text{SnBr}_6$  ( $\text{A} = \text{Cs}, \text{Rb}, \text{NH}_4, \text{K}$ )*. Zeits. Krist., 1938, vol. 100, pp. 265–271.

Rhombohedral unit cell of  $\text{Cs}_2\text{SnBr}_6$ ,  $\text{Rb}_2\text{SnBr}_6$ ,  $(\text{NH}_4)_2\text{SnBr}_6$  contains four molecules and has an edge of 10.81, 10.64, 10.59 Å. respectively. Potas-

sium bromostannate has probably the space-group  $D_4^2$  with a pseudo-cubic unit cell having  $a$  10.51 and  $c$  10.61 Å. H.

SILLÉN (Lars Gunnar). *X-ray studies on bismuth trioxide*. Arkiv Mineral. Geol., 1938, vol. 12 A, Häfte 5, no. 18, 15 pp., 3 figs.

Four distinct modifications of  $\text{Bi}_2\text{O}_3$  were prepared. Minute needles of  $\alpha\text{-Bi}_2\text{O}_3$ , the form stable at ordinary temperatures, yield Laue photographs showing that the symmetry is monoclinic, not as formerly proposed orthorhombic. Powder and Laue photographs give  $a$  5.83,  $b$  5.83,  $c$  13.78 Å. for the pseudo-orthorhombic cell containing  $8\text{Bi}_2\text{O}_3$ ; calculated sp. gr. 9.39. A tetragonal form  $\beta\text{-Bi}_2\text{O}_3$  was produced by fusing bismuth in a graphite stove at  $800^\circ\text{C}$ . and collecting the oxide smoke in a cool glass funnel. This form reverts to  $\alpha\text{-Bi}_2\text{O}_3$  on heating to  $650^\circ\text{C}$ . Powder photographs of the  $\beta$  form show that the unit cell containing  $8\text{Bi}_2\text{O}_3$  has  $a$  10.93,  $c$  5.62 Å., and space-group  $D_{2d}^7$ ; calculated sp. gr. 9.18. A simple cubic phase contaminated with silica is produced by rapidly cooling  $\alpha\text{-Bi}_2\text{O}_3$  fused at  $900^\circ\text{C}$ . in a porcelain crucible. The unit cell containing  $2\text{Bi}_2\text{O}_3$  has  $a$  5.525 Å. and space-group  $O_h^4$ . This phase is similar in structure to  $\text{As}_2\text{O}_3$  and  $\text{Sb}_2\text{O}_3$  and isomorphous with  $\text{Mn}_2\text{O}_3$ . A body-centred cubic phase is produced by fusing  $\text{Bi}_2\text{O}_3$  in a porcelain crucible for five minutes, or by fusing the oxide with alumina or iron oxide in a silver crucible at  $930^\circ\text{C}$ . for thirty minutes. No differences in intensities of the powder photographs of the three body-centred cubic products could be found, but the unit cell containing  $\text{Me}_2\text{Bi}_{24}\text{O}_{40}$  has  $a$  10.08 Å. for the silica fusion product and 10.16 Å. for the alumina or iron oxide products. The observed sp. gr. of  $\text{Fe}_2\text{Bi}_{24}\text{O}_{40}$  is 9.0. The space group of the body-centred cubic products is  $T^3$ . The crystal-structures of all four phases except monoclinic  $\alpha\text{-Bi}_2\text{O}_3$  have been derived. F.

GLISZCZYNSKI (S. von) & STOICOVICI (E.). *Beitrag zum Melanophogitproblem*. Zeits. Krist., 1938, vol. 99, pp. 238–250, 7 figs.

It follows from X-ray powder photographs and other considerations that melanophogite is not a distinct mineral species, but consists of high-temperature quartz obtained from the gradual decomposition of high-temperature cristobalite. H.

TYLER (S. A.) & MARSDEN (R. W.). *The nature of leucoxene*. Journal of Sedimentary Petrology, 1938, vol. 8, pp. 55–58, 1 fig.

X-ray photographs of leucoxene from various localities gave in all cases the pattern of rutile, and in one that of anatase. The mineral is an alteration product of sphene or ilmenite. L. J.

SON (G. C.) & STOSICK (A. J.). *The molecular structure of arsenious oxide,  $As_4O_6$ , phosphorus trioxide,  $P_4O_6$ , phosphorus pentoxide,  $P_2O_5$ , and hexamethylenetetramine,  $(CH_2)_6N_4$ , by electron diffraction.* *J. Amer. Chem. Soc.*, 1938, vol. 60, pp. 1814–1822, 7 figs. Atomic distances, As—O 1.80 Å., &c. are recorded. L. J. S.

FRÖM (Klas). *Über den Bau des wahren Antimontetroxyds und des mit isomorphen Stibiotantalits,  $SbTaO_4$ .* *Zeits. Anorg. Chem.*, 1938, vol. 239, pp. 57–64, 1 fig.

Antimony tetroxide, obtained by igniting  $Sb_2O_3 \cdot OH$  at 800–900° C., is rhombic, space-group  $C_{2v}^9$ , with  $a$  4.804,  $b$  5.424,  $c$  11.76 Å., the unit cell containing 4 $Sb_2O_4$ . Stibiotantalite has  $C_{2v}^9$ ,  $a$  4.916,  $b$  5.542,  $c$  11.76 Å., and 4 $SbTaO_4$  in the unit cell. Antimony tetroxide is therefore isomorphous with antimonate  $Sb^{III}Sb^{V}O_4$ . [M.A. 7-86, 121.] L. J. S.

WYVIST (Karin), WALLMARK (Signe), & WESTGREN (A.). *Röntgenuntersuchung der Systeme  $CaO-Al_2O_3$  und  $SrO-Al_2O_3$ .* *Zeits. Anorg. Chem.*, 1937, vol. 234, pp. 1–16, 2 figs.

$CaAl_2O_3$  and  $3SrO \cdot Al_2O_3$  have a simple cubic lattice with  $a$  15.22 Å. and 15.9 Å. respectively.  $12CaO \cdot 7Al_2O_3$  is body-centred cubic,  $a$  11.95 Å.  $CaAl_2O_3$  and  $SrO \cdot Al_2O_3$  both have a low degree of symmetry.  $Ca_2Al_2O_3$  and  $SrO \cdot 2Al_2O_3$  are monoclinic with  $a$  12.82,  $b$  8.84,  $c$  5.42 Å.,  $\beta$  121° 12' and  $a$  12.94,  $b$  9.00,  $c$  5.54 Å.,  $\beta$  73° 57', similar to diopside.  $Ca_2Al_2O_3$  and  $3SrO \cdot 16Al_2O_3$  have  $a$  5.536,  $c$  21.825 Å., and  $a$  5.557,  $c$  21.825 Å., isomorphous with  $\beta$ - $Al_2O_3$ . L. J. S.

ASU-MIEN). *The crystal structure of sodium metaborate  $Na_3(B_3O_6)$ .* *Zeits. Krist.*, 1938, vol. 99, pp. 1–8, 4 figs.

The space-group of sodium metaborate is  $D_{3d}^6$ . The rhombohedral unit cell contains six molecules of  $NaBO_2$ , having an edge 7.22 Å. and an angle 111° 29'. H. S.

SON (Jane E.). *The crystal structure of sodium bromate.* *Zeits. Krist.*, 1938, vol. 100, pp. 104–110, 2 figs.

The space-group of sodium bromate is  $T^4$ . The unit cell contains four molecules of  $NaBrO_3$  and has an edge of 6.71 Å. H. S.

HOOD (E. A.). *A determination of the oxygen parameters for  $NaIO_4$ .* *Zeits. Krist.*, 1938, vol. 98, pp. 439–446, 1 fig.

Continuing previous work, the author found the space-group of sodium periodate to be  $C_{4h}^6$ , the unit cell having  $a$  5.3222 and  $c$  11.93 Å. There



are four iodine atoms in position (*a*), four sodium atoms in position (*b*) and oxygen atoms in position (*f*), with variable parameters  $0.159, 0.089$ .

JONG (W. F. de) & BOUMAN (J.). *Das reziproke und das Bravais-Gitter von Gips*. Zeits. Krist., 1938, vol. 100, pp. 275–276, 3 figs.

Taking new crystallographic axes the authors give for the unit cell of gypsum containing four molecules of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   $a$  5.63,  $b$  10.4,  $c$  6.23 Å,  $\beta$  66° 10'.

WEINERT (G.). *Die Raumgruppe des Kieserits:  $\text{MgSO}_4 \cdot \text{H}_2\text{O}$* . Naturwiss., 1938, vol. 26, p. 410.

Crystals from Wathlingen gave  $a$  6.89,  $b$  7.69,  $c$  13.5 Å.,  $\beta$  88° 10', with 8 mols.  $\text{MgSO}_4 \cdot \text{H}_2\text{O}$  in the unit cell; space-group  $C_{2h}^6$ .

IDE (K. H.). *Zur Struktur des  $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}(\alpha)$* . Naturwiss., 1938, vol. 26, p. 411.

Crystals from a solution containing also  $\text{MgCl}_2$  gave  $a$  10.04,  $b$  10.4,  $c$  24.34 Å.,  $\beta$  81° 26', with 8 mols.,  $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}$  in the unit cell; space-group  $C_{2h}^6$ .

BARNES (W. H.) & WENDLING (A. V.). *The structure of rubidium dithionate  $\text{Rb}_2\text{S}_2\text{O}_6$* . Zeits. Krist., 1938, vol. 99, pp. 153–180, 7 figs.  
 ———— *On the nature of twinning in potassium and rubidium dithionates*. Amer. Min., 1938, vol. 23, pp. 391–398, 1 fig. [M.A. 6-182].

Rubidium dithionate has the space-group  $D_3^2$ . The unit cell contains three molecules of  $\text{Rb}_2\text{S}_2\text{O}_6$  and has  $a$  10.02,  $c$  6.35 Å. The positions of the elements in the structure are obtained and compared with those found by other experimenters [M.A. 5-182].

MILLER (J. J.). *The crystal structure of caesium chromate  $\text{Cs}_2\text{CrO}_4$* . Krist., 1938, vol. 99, pp. 32–37, 1 fig.

Caesium chromate is isomorphous with potassium chromate, cerium sulphate, and potassium sulphate. Its space-group is  $V_h^{16}$ . The unit cell contains four molecules of  $\text{Cs}_2\text{CrO}_4$  and has  $a$  6.226,  $b$  11.135,  $c$  8.127 Å.

SASVÁRI (K.). *Die Struktur des Silberpermanganats  $\text{AgMnO}_4$* . Krist., 1938, vol. 99, pp. 9–15, 1 fig.

Silver permanganate has the space-group  $C_{2h}^5$ . The unit cell contains four molecules of  $\text{AgMnO}_4$  and has  $a$  5.665,  $b$  8.27,  $c$  7.127 Å.,  $\beta$  88° 10'.

TSCH (Haymo). *Vorbericht über röntgenographische Untersuchungen an Olivenit*  $\text{Cu}_2(\text{OH})(\text{AsO}_4)$ . Zeits. Krist., 1937, vol. 98, pp. 351–353. *Die Struktur des Olivenites*  $\text{Cu}_2(\text{OH})(\text{AsO}_4)$ . Ibid., 1938, vol. 99, p. 466–479, 1 fig.

Olivenite has an orthorhombic unit cell containing four molecules of  $\text{H}(\text{AsO}_4)$  with  $a$  8.62,  $b$  8.20,  $c$  5.94 Å. (the  $a$  and  $b$  axes being interchanged); space-group  $D_{2h}^1$ . H. S.

TSCH (H.). *Über eine Strukturuntersuchung an Libethenit*  $\text{Cu}_2(\text{OH})(\text{PO}_4)$ . Naturwiss., 1938, vol. 26, p. 529.

Similarity with andalusite and olivenite suggests that the horizontal axes should be interchanged. L. J. S.

DROS (P.). *Über die Struktur des Durangit*  $\text{NaAlF}(\text{AsO}_4)$ . Zeits. Krist., 1938, vol. 99, pp. 38–49, 4 figs. [M.A. 7–89.]

Durangite has the space-group  $C_{2h}^6$ . The unit cell contains four molecules of  $\text{NaAlF}(\text{AsO}_4)$  and has  $a$  6.53,  $b$  8.46,  $c$  7.00 Å.,  $\beta$  64° 47'. H. S.

LEMA (J.). *On the composition and the crystallography of autunite and meta-autunites*, Rec. Trav. Chim. Pays-Bas, 1938, vol. 57, pp. 155–175, 5 figs.

The water content of artificial autunite [M.A. 4–307] was determined by means of vapour-pressures and temperatures. There are hydrates at  $10\frac{1}{2}\text{H}_2\text{O}$  and  $6\frac{1}{2}\text{H}_2\text{O}$ . The material shows low birefringence with uniaxial plane along a diagonal of the square plate; 2V up to 53°, etc. On exposure to dry air this passes to meta-autunite-I with  $6\frac{1}{2}\text{H}_2\text{O}$ , which is optically uniaxial. This change is reversible. At higher temperatures this passes to meta-autunite-II with no water, and this change is also reversible. Autunite from Limoges, France, has  $a$  6.99,  $c$  20.63 Å.,  $(\text{UO}_2)_2(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$  in the unit cell; if  $n = 10\frac{1}{2}$  the calculated  $d$  is 3.569; space-group  $D_{4h}^{17}$ . Meta-autunite-I has  $a$  6.98,  $c$  8.42 Å.; if  $n = 6\frac{1}{2}$  the calculated  $d$  is 3.569; space-group  $D_{4h}^{17}$ . Meta-autunite-II has  $a$  6.45,  $c$  8.65 Å.; space-group  $C_{2h}^1$ . Barium-autunite with  $6\text{H}_2\text{O}$ ,  $2\text{H}_2\text{O}$ , or no water has in all cases  $a$  6.95,  $c$  8.51 Å. The structure is built up of  $\text{PO}_4$ -tetrahedra and  $\text{UO}_6$ -octahedra, with large cavities between them. The cations in meta-autunite-I do not occupy fixed positions, because of their great mobility they are called 'vagabond ions'.

L. J. S.

RO (E.). *Ricerche röntgenografiche sulla leucite*. Periodico Min. Ital., 1938, vol. 9, pp. 85–97, 3 pls., 2 text-figs.

Leucite is monoclinic with a unit cell,  $a$  13.00,  $b$  12.95,  $c$  13.70,  $\beta$  90°.

containing 16 mols,  $\text{KAl}(\text{SiO}_3)_2$ . The pseudo-cubic crystals are built of lamellae twinned on (110), (011), (101), and ( $\bar{1}01$ ). Optically orthorhombic. [Min. Mag., 22-471; M.A. 6-412.] L. J.

[BELOV (N. V.)] Белов (Н. В.). О статической и кинетической (ядерных) формулах нефелина.—BELOW (N. V.). *On the statical and dynamical (nuclear) formulae of nephelinite*. Академику В. И. Вернадскому в пятидесятилетие научной и педагогической деятельности. Акад. Наук СССР [Vernadsky jubilee volume, Acad. Sci. USSR], 1947, vol. 1, pp. 581-584, 1 fig. (Russian with English summary.)

The structural (statical) formula of nepheline, similar to that of pyrite in which half of the tetrahedra of  $\text{SiO}_4$  are replaced by  $\text{AlO}_4$ , is contrasted to 'nuclear' formula derived from chemical considerations and their mutual relations are explained. S. I.

HENDRICKS (Sterling B.). *On the crystal structure of talc and pyrophyllite*. Zeits. Krist., 1938, vol. 99, pp. 264-274, 3 figs.

The X-ray photographs of talc and pyrophyllite were taken from single crystals in order to check the results obtained from the powder method by J. W. Gruner [M.A. 6-45]. The accuracy of the earlier determination of the lattice dimensions was verified. H.

NÁRAY-SZABÓ (István). *A pollucit,  $\text{CsAlSi}_2\text{O}_6 \cdot x\text{H}_2\text{O}$ , szerkezete*. NÁRAY-SZABÓ (St. v.). *Die Struktur des Pollucits  $\text{CsAlSi}_2\text{O}_6 \cdot x\text{H}_2\text{O}$* . Term.-tud. Értesítő, Budapest, 1938, vol. 57, pp. 653-663, 1 fig. (Hungarian with German summary.)

NÁRAY-SZABÓ (St. v.). *Die Struktur des Pollucits  $\text{CsAlSi}_2\text{O}_6 \cdot x\text{H}_2\text{O}$* . Zeits. Krist., 1938, vol. 99, pp. 277-282, 1 fig.

Pollucite has a tetragonal pseudo-cubic structure with space-group  $D_{4h}^{20}$  pseudomorphic after  $\text{O}_h^{10}$ . The unit cell contains sixteen molecules of  $\text{CsAlSi}_2\text{O}_6 \cdot x\text{H}_2\text{O}$  and has  $a$  13.74 Å. It is suggested that analcime has the same structure. V.

TAYLOR (W. H.). *Note on the structures of analcite and pollucite*. Krist., 1938, vol. 99, pp. 283-290, 1 fig.

NÁRAY-SZABÓ (St.). *Note on the structure of analcite*. Ibid., p. 291. A discussion on the relation between the structures of pollucite [preceding abstract] and analcime. H.

[BRUNOVSKY (B. K.)] Бруновский (Б. К.). Исследование каталитических свойств рентгеновыми лучами.—BRUNOWSKY (B.). *Untersuchung des*



Zeits. mittels Röntgenstrahlen. Труды Ломоносов. Инст. Геохим. Инст. Мин., Акад. Наук СССР (Trav. Inst. Lomonossoff Géochim. Inst. Min., Acad. Sci. URSS), 1935, no. 6, pp. 33–44, 6 figs. (Russian with German summary.)

U-catapleiite from the Khibina tundra is assigned to the hexagonal group  $D_{6h}^4$  with two molecules of  $\text{Na}_2\text{ZrSi}_3\text{O}_9 \cdot 2\text{H}_2\text{O}$  per unit cell in  $a$  7.39,  $b$  10.05 Å. S. I. T.

ROOT (Dorothy). *The molecular weight of fichtelite*. Journ. Chem. Soc. London, 1938, pp. 1241–1242.

Fichtelite ( $d$  1.045) has a unit cell  $a$  10.69,  $b$  7.45,  $c$  13.10 Å. ( $a:b:c = 1:1.758$ ),  $\beta$   $52^\circ 55'$ ; or, from comparison with sterol,  $a$  10.69,  $c$  10.84 Å,  $\beta$   $75^\circ 36'$ . Space-group  $P2_1$ . The unit cell contains two molecules  $\text{C}_{19}\text{H}_{34}$ , rather than  $\text{C}_{18}\text{H}_{32}$ . L. J. S.

### Mathematical Crystallography.

DE VRIES (P.) & WEERDEN (W. J. van). *Studies on Barker's principle of reciprocal indices*. Zeits. Krist., 1936, vol. 95, pp. 368–382, 13 figs.

Twenty-six poles of the faces ( $\alpha\beta\gamma$ ), where  $\alpha, \beta, \gamma$  are each 0, +1, or -1 (not all three zero) lie on nine zone-circles. The authors consider the problem: If only  $n$  of these poles occur, in how many ways can they be distributed among the twenty-six intersections of the nine zone-circles; how many of these ways are essentially distinct if two distributions, with the relative positions of the  $n$  poles are the same, are considered identical? How many ways exist, if a pair of parallel faces is considered as forming a single plane? H. S.

DE VRIES (P.). *Die Polygone der Ebenenteilungen*. Zeits. Krist., 1937, vol. 96, pp. 78–80, 4 figs.

Asymmetric packings of circles in a plane are described in addition to the thirty-one given by Niggli. H. S.

DE VRIES (P.). *Raumgitterzahlen*. Zeits. Krist., 1937, vol. 97, p. 234.

A method of expressing any integer not exceeding 500 as the sum of not more than four squares. H. S.

DE VRIES (P.). *Die äußere Form der Kristalle in ihrem Einfluß auf die Beugungserscheinungen an Raumgittern*. Ann. Physik, 1936, ser. 5, vol. 11, pp. 55–68.

DE VRIES (P.) & RIEWE (K. H.). *Der Kristallformfaktor für das Oktaeder*. Zeits. Krist., 1936, vol. 95, pp. 408–420.

The influence of the outer form of a crystal upon the intensities of its

X-ray diffractions is discussed first of all for the general case and then in more detail for an octahedron. F. A.

RIEWE (K.-H.). *Mathematisches zur Theorie des Kristallformalismus*. Zeits. Krist., 1937, vol. 96, pp. 85-86.

A note on the integral of  $\exp. 2\pi i(\xi_1 A_1 + \xi_2 A_2 + \xi_3 A_3)$  taken over the volume of a parallelepiped, which occurs in the theory of lattice interference phenomena. H.

SCHAAKKE (Ingeburg). *Zwillingsbildung als gittergeometrisch-zootheoretisches Problem mit Anwendung auf einige reale Fälle*. Zeits. Krist., 1937, vol. 98, pp. 143-167, pp. 211-232, 5 figs.

The well-known geometrical theory of crystal-structure is modified to cover the case of twin crystals. H.

JOHNSON (Vivian A.). *The mathematical expression of charge distribution in a space lattice*. Zeits. Krist., 1937, vol. 96, pp. 493-496.

A proof is given of the convergence of the usual series employed to represent the electrostatic potential of a lattice at any point. H.

TERTSCH (H.). *Zur Indizesbestimmung stereographisch projizierter Kristallflächen*. Zeits. Krist., 1938, vol. 99, pp. 61-66, 4 figs.

Graphical methods are given, involving a combination of gnomonic and stereographic projections, for obtaining the face-indices and crystallographic constants of a crystal when the stereographic projection of the poles is known. H.

TERTSCH (H.). *Zur Ableitung der Deckachsen-Zähligkeit*. Zeits. Krist., 1938, vol. 98, pp. 275-278, 2 figs.

The author gives elementary proofs of the theorems that every axis of symmetry is perpendicular to a possible crystal face and parallel to a possible edge, and that the symmetry is  $n$ -fold where  $n = 1, 2, 3, 4, 6$ . H.

TERTSCH (H.). *Graphische Darstellung der Möglichkeiten von Deckachsenkombinationen*. Zeits. Krist., 1938, vol. 100, pp. 85-90, 4 figs.

A graphical method is given for determining the possible varieties of axes of symmetry which a body can possess simultaneously. H.

REINICKE (Richard). *Über gleichzeitig auf Würfel- und Kugeloberflächen gelegene 'merkwürdige Punkte'*. Zeits. Krist., 1937, vol. 98, pp. 106, 11 figs.

If  $(2n)^3$  similarly orientated cubes, each of edge  $2a$ , are packed to

a cube with centre  $O$ , then a sphere with  $O$  as centre and radius  $xa$  through  $8k$  of their centres. In this  $k$  is the sum of six times the number of ways of putting  $x^2$  in the form  $p^2+q^2+r^2$ , three times the number of ways in which  $x^2=2p^2+q^2$ , and the number of ways in which  $x^2=p^2$ , where  $p, q, r$  are chosen out of the integers  $1, 3, 5, \dots, 2n-1$  no two are equal. The author works out in detail the geometry of this configuration with a view to its possible application to the structure of organic compounds.

H. S.

ДОБРОВОВСКИЙ (V. V.) [1904–1936] ] Доливо-Добровольский (B. B.). Номенклатура и символика пространственных групп симметрии.—DOLIWO-DOBROWOLSKY (W. W.). *Nomenklatur und Symbolik der Raumgruppen*. Зап. Ленинград. Горн. Инст. (Ann. Inst. Mines, Leningrad), 1937, vol. 10, pt. 2, pp. 53–113, 35 text-figures. (Russian), pp. 114–117 (German summary), 3 sheets.

Extension of an earlier paper on the 32 crystal-classes [M.A. 6–79], with the 230 space-groups. The several symbols that have been used by different authors are tabulated on large sheets, and a new set of symbols is devised, and even special names for every one of the 230!

L. J. S.

ДОБРОВОВСКИЙ (V. V.) [1904–1936] & АЛЯВДИН (V. F.) ] Доливо-Добровольский (B. B.) и Алявдин (B. Ф.). Таблицы для вычисления тетрагирных (тетрагональных) кристаллов.—DOLIWO-DOBROWOLSKY (W. W.) und ALJAWDIN (W. F.). *Tabellen zur Berechnung der tetragyrischen (tetragonaler) Kristalle*. Зап. Ленинград. Горн. Инст. (Ann. Inst. Mines, Leningrad), 1937, vol. 10, pt. 2, pp. 119–212, 2 figs. (Russian with German summary.)

Main table (pp. 124–204) gives polar angles  $(001):(111)$  from  $5^\circ 0'$  for every minute with the corresponding values for  $\log \tan \rho_{111}$ ,  $\tan \rho_{011}$ , and the length of the  $c$ -axis.

L. J. S.

ХАКЕР (J. D. H.) & ХАРКЕР (David). *Généralisation de la loi de Bravais*. Compt. Rend. Acad. Sci. Paris, 1937, vol. 204, pp. 274–276.

— *A new law of crystal morphology extending the law of Bravais*. Amer. Min., 1937, vol. 22, pp. 446–467, 1 fig.

Law of Bravais states that the reticular density of the lattice is proportional to the area of the more important faces of a crystal. Some of the several extensions to this law are covered when it is stated in the following form. The morphological importance of a crystal face is inversely proportional to its reticular area  $S$  if the lattice is of the hexagonal mode (no



centering) and the space group symmetry does not contain any axis or glide plane. The effect of lattice centering, screw axes, and planes is corrected for if the face indices are replaced, in the  $S$  form by the "multiple indices" of the lowest order of  $x$ -ray reflection compatible with the space group symmetry.' L. J.

DONNAY (J. D. H.). *Le développement des zones cristallines*. Bull. Géol. Belgique, 1938, vol. 61, pp. 260–287, 15 figs.

From the distribution of faces and nodes two types of zones are distinguished—simple and double. These are divided into nine and sub-types respectively. From them the space-group can be deduced. L. J.

BUTTGEBACH (H.). *Sur la symbolisation des formes cristallines*. Acad. Roy. Belgique, Cl. Sci., 1938, ser. 5, vol. 24, pp. 259–284, 15 figs.

All faces in a zone are given the same letter followed by a number based on the Miller indices. L. J.

PARKER (Robert L.). *A note on the morphology of monazite*. Amer. Mineralogist, 1937, vol. 22, pp. 572–580, 3 figs.

A statistical analysis is made of the 42 crystal-forms in 99 different combinations shown on 133 published drawings of monazite crystals and their persistence (relative frequency) and relative sizes are related. The morphology is of the hypocubic type with a distinct tendency towards the tabular mode of the tetragonal group. L. J.

KLEBER (Willi). *Die strukturtheoretische Diskussion kristallmorphologischer Fragen*. Fortschr. Min. Krist. Petr., 1937, vol. 21, pp. 215–224, 4 figs.

A review and discussion on the relation between the structure and morphology of crystals, with 147 references to the literature. L. J.

BUERGER (M. J.). *The X-ray determination of lattice constants and ratios of crystals belonging to the oblique systems*. Amer. Mineralogist, vol. 22, pp. 416–435, 5 figs.

The accurate determination of axial lengths and axial angles of monoclinic and triclinic crystals by the Weissenberg method is explained. L. J.

PARSONS (A. L.). *Two-circle calculation in the hexagonal system*. Amer. Mineralogist, 1937, vol. 22, pp. 581–587, 1 fig.

Formulae are given. Attention is called to the confusion caused by the 'G<sub>1</sub>' and 'G<sub>2</sub>' positions of V. Goldschmidt. L. J.

### Physical Properties.

(H. A.). *Elastic constants of anisotropic solids. Group-theoretical treatment.* Zeits. Krist., 1937, vol. 98, pp. 191–200.

proof is given by group-theoretical methods of the dependence of the constants on crystal symmetry. The relations found agree with those first established by W. Voigt in 1882. H. S.

es (David). *Deformation of single calcite crystals under high confining pressures.* Amer. Min., 1938, vol. 23, pp. 28–33, 5 figs.

inders and prisms of Iceland-spar cut with axes parallel to the  $c$ -axis while subjected to liquid pressures (up to 10,000 atmos.) were compressed by a directional pressure. The strength of the crystal is increased by the liquid pressure, and the ductility is much less than in aggregates (marble and limestone). Twinning on  $(10\bar{1}2)$  is the dominant mode of deformation. L. J. S.

(Károly). *Az ingós sklerométerrel kapcsolatos kérdések.* BALYI (K.) *Über die mit dem Pendelsklerometer verbundenen Fragen.* Földtani Közlöny, Budapest, 1938, vol. 68, pp. 59–67, 5 figs. (Hungarian with German summary.)

Observations of damping of swingings of the pendulum sclerometer in the following order of the hardness: talc, rock-salt, gypsum. On the other hand, values from the widths of the scratches are approximately in the order of the Mohs scale. V. Z.

CH (H.). *Zur Frage der Verteilung der Mohs'schen Ritzhärte.* Neues Jahrb. Min., Abt. A, 1938, Beil.-Bd. 73, pp. 375–388, 1 pl.

A wide difference between the hardness of diamond and graphite (though other dimorphous minerals show no marked differences) indicates that hardness is in part dependent on structure. But minerals with the same structure may vary widely in hardness; e.g. the face-centred metals Pb, Au, Ag, Cu, Pt, Pd, Ir, range in H. from  $1\frac{1}{2}$  to 7, and this is accompanied by a decrease in atomic radius from 1.74 to 1.35 Å. The hardnesses of a large number of minerals are tabulated according to the periodic elements, and in each group of the periodic system there is thought to be some relation between hardness and ionic radii. L. J. S.

ШУБНИКОВ (A. V.) & TZINZERLING (E. V.) Шубников (A. B.) и Зинзерлинг (E. B.). О фигурах удара и давления и о механических свойствах кварца.—SCHUBNIKOW (A.) et ZINSERLING (C.). *Sur les effets de choc et de compression et sur les macles mécaniques de*

quartz. Труды Ломоносов. Инст. Геохим. Крист. Мин., АН  
 Hayк СССР (Trav. Inst. Lomonossoff Géochim. Crist. Min., A  
 Sci. URSS), 1933, no. 3, pp. 5-23, 31 figs. [Russian]. [Cf. M.A.  
 211.]

[TZINZERLING (E. V.) & SHUBNIKOV (A. V.)] Цинзерлинг (Е.  
 Шубников (А.). О „пластичности“ кварца.—ZINSERLING  
 und SHUBNIKOW (A.). *Über die Plastizität des Quarzes*. И  
 pp. 67-74, 6 figs. (Russian with German summary.) [Cf. M.  
 5-348.]

By dropping a steel ball on different faces of quartz crystals  
 authors obtained percussion-figures which proved to be identical v  
 pressure-figures. The percussion-figure on the face (0001) is a triang  
 pyramid corresponding to the rhombohedron ( $1\bar{1}01$ ) but with conc  
 faces and convex edges. Percussion-figures on other faces are interpre  
 in terms of this rhombohedron. Pressure-figures are usually accompan  
 by twinning which is revealed by etching with HF. The mechan  
 twinning is explained on the basis of atomic structure of quartz.

S. I. T

[VOLAROVICH (M. P.)] Волярович (М. П.). Применение мето  
 исследования вязкости и пластичности в прикладной мине  
 логии.—VOLAROVICH (WOLAROWITSCH) (M. P.). *Application  
 viscometry and plastometry to problems of applied mineralogy*. Тр  
 Инст. Прикл. Мин. (Trans. Inst. Econ. Min.), 1934, no. 66, 56  
 26 figs. (Russian with English summary.)

A detailed discussion of the theory of viscosity and the appar  
 used is followed by an account of the results of the measuremen  
 viscosity of clay suspensions, slags, and molten igneous rocks.  
 English summary is very short and does not supply the data obtain

S. I. 7

BOWDEN (F. P.) & HUGHES (T. P.). *Physical properties of surf  
 IV—Polishing, surface flow and the formation of the Beilby la  
 Proc. Roy. Soc. London, Ser. A, 1937, vol. 160, pp. 575-587, 7*

It is suggested that at the very small areas in actual contact during  
 process of polishing high temperatures may be reached with local mel  
 of the material. Further, it is suggested that the capability of produ  
 a polish depends on the polishing material having a higher melting-p  
 than the body, rather than a higher degree of hardness. For exam  
 calcite (m.p.  $1333^{\circ}$  C.) is polished by zinc oxide (m.p.  $> 1800^{\circ}$ ), but



ous oxide (m.p.  $1235^{\circ}$ ); and quartz (m.p.  $1710^{\circ}$ , H. 7) is polished  
the oxide (H. 4).  
L. J. S.

LEIGH (Lord). *The surface layer of polished silica and glass with  
further studies on optical contact.* Proc. Roy. Soc. London, Ser. A,  
1937, vol. 160, pp. 507–526, 1 pl., 3 text-figs.

reflecting power of a surface of silica-glass immersed in a liquid  
same refractive index (1.461) varies according to the treatment  
surface has received. Surfaces polished by a process that removes  
material rapidly or when washed in dilute HF do not reflect appreciably;  
those polished by methods (with carborundum or preferably  
‘adam’ on a dry felt wheel) that do not remove material quickly may  
0.28% of the incident light. In the latter case the surface has  
gone a kind of burnishing with increase in refractive index up to  
higher than that of any crystallized form of silica!). The modified  
has a thickness of  $0.06\lambda$ , where  $\lambda$  is the wave-length of green light.  
These effects were found in a less degree in ordinary glass, and  
very much less degree in quartz.  
L. J. S.

(E. A.) & ROBERTS (E. W.). *The thermal expansion of the crystal  
lattices of cadmium, osmium, and ruthenium.* Phil. Mag. London,  
1936, ser. 7, vol. 22, pp. 290–303, 4 figs.

— *The crystal parameters of osmium and ruthenium at different  
temperatures.* Zeits. Krist., 1937, vol. 96, pp. 497–498.

size of the unit cells was measured at different temperatures  
from  $20^{\circ}$  to  $600^{\circ}$  C., and the coefficients of thermal expansion  
d.  
H. S.

(E. A.) & RICHARDS (T. Ll.). *On the thermal expansion of beryllium.*  
Phil. Mag. London, 1936, ser. 7, vol. 22, pp. 304–311, 1 fig.

cell dimensions of beryllium (Be 99.8%) range from  $a$  2.2813,  
33 ( $c/a$  1.5681) at  $20^{\circ}$  C. to  $a$  2.3025,  $c$  3.6023 ( $c/a$  1.5645) at  $550^{\circ}$  C.  
L. J. S.

WALT (J. D.) & FREVEL (L. K.). *X-ray measurement of the thermal  
expansion of magnesium.* Zeits. Krist., 1937, vol. 98, pp. 84–88,  
figs.

linear coefficients of thermal expansion of metallic magnesium,  
determined by X-rays in the range of temperature  $50^{\circ}$  to  $250^{\circ}$  C., are  
 $(1.4)10^{-6}$  perpendicular to the  $c$ -axis and  $(29.3 \pm 1.0)10^{-6}$  parallel  
to  $c$ -axis.  
H. S.

POWELL (R. W.) & GRIFFITHS (Ezer). *The variation with temperature of the thermal conductivity and the X-ray structure of some micas. I—The thermal conductivity up to 600° C.* Proc. Roy. Soc. London, Ser. A, 1937, vol. 163, pp. 189–198, 5 figs.

WOOD (W. A.). — *II—The X-ray examination of the structure.* Ibid. pp. 199–204, 3 pls., 1 text-fig.

Phlogopite from Canada and Madagascar shows a marked decrease in the thermal conductivity at 200° C. Muscovite from India does not show this effect. Phlogopite shows a regular expansion of the lattice spacing up to 400° C.; but at 200° C. a mosaic structure is developed with tilting of the 'crystallites'. L. J. S.

BOROS (János). *Ion vezetés vékony kristályrétegekben.* [Ion-conductivity in thin crystal layers.] Mat. Term.-tud. Értesítő, Budapest, 1937, vol. 56, pp. 655–670, 7 figs.

The conductivity for longitudinal and transversal measurements of thin (1500–9000 and 8000–30,000 Å.) layers of NaCl, produced by volatilization, is very much higher than for a single crystal. In the longitudinal direction the conductivity increases with decreasing thickness, while in the transversal direction it increases with the thickness. The temperature-coefficient is small below about 250° C., and beyond this becomes higher. V. Z.

BRAGG (Sir William). *The electric properties of crystals.* Proc. Roy. Soc. Great Britain, 1936, vol. 29, pp. 225–230, 290–295, 3 figs.

A lecture giving a general review.

L. J. S.

GREENWOOD (Gilbert). *The pyroelectric behaviour of picric acid crystals.* Zeits. Krist., 1937, vol. 96, pp. 81–84, 1 fig.

Picric acid crystals grown by very slow evaporation of an alcoholic solution are holohedral in form. Tested for pyroelectric properties by Kundt's dusting method, by low-temperature experiments, and by electrometer observations, they showed no pyroelectric phenomenon large enough to be detected. H. S.

BELLANCA (A.). *Piezoelettricità polare e simmetria di alcune specie cristalline.* (Nota I). Periodico Min. Roma, 1938, vol. 9, pp. 323–330, 1 fig.

The crystal is placed between metal electrodes to one of which is attached a tuning fork actuated by electromagnets controlled by a thermionic valve. Any piezoelectric charge on the electrodes is detected.

with an amplifier. Sections of gypsum parallel to (010), (100), and (001) show no effect, proving that the crystal is holosymmetric, and not hemisymmetric as has been suggested from the evidence of etch-figures.

L. J. S.

WONSDALE (Kathleen). *Diamagnetic anisotropy of cyanuric trichloride*,  $C_3N_3Cl_3$ . Zeits. Krist., 1936, vol. 95, p. 471.

Cyanuric trichloride forms large monoclinic tabular crystals with the symmetry-axis  $b$  parallel to the tabular faces. If  $\chi_2$ ,  $\chi_3$ ,  $\chi_1$ , are the magnetic susceptibilities perpendicular to the tabular faces, along the  $b$ -axis, and perpendicular to these two,

$$\chi_2 - \chi_1 = -30.1 \times 10^{-6}, \quad \chi_2 - \chi_3 = -30.4 \times 10^{-6}.$$

The mean susceptibility is  $-81.1 \times 10^{-6}$ .

H. S.

WONSDALE (Kathleen). *Magnetic anisotropy of crystals*. Sci. Progr. London, 1938, vol. 32, pp. 677-693, 1 fig.

— *Diamagnetic and paramagnetic anisotropy of crystals*. Rep. Progr. Physics (Phys. Soc.), 1938, vol. 4, pp. 368-389, 2 figs.

A general review. [M.A. 6-285.]

L. J. S.

BRUSHNAN (K. S.) & BANERJEE (S.). *Magnetic studies on rhodochrosite*,  $MnCO_3$ . Zeits. Krist., 1938, vol. 99, pp. 499-508, 2 figs.

For crystals containing 96%  $MnCO_3$  and 0.036-0.241%  $FeCO_3$ , the mean susceptibility at room-temperature is  $12,000 \times 10^{-6}$  per gm. mol.  $MnCO_3$ , decreasing to 7050 at 209° C. The anisotropy is very feeble, only 0.06% of the mean susceptibility.

L. J. S.

### Crystal-optics.

BEJANKIN (D. S.), KUPRIYANOVA (L. M.), & SMIRNOV (V. A.) [Белянкин (Д. С.), Куприянова (Л. М.) и Смирнов (В. А.)]. К вопросу о влиянии на светопреломление мусковита истирания этого минерала.—BEJANKIN (D. S.), KUPRIYANOVA (L. M.), and SMIRNOV (V. A.). *The influence of crushing of muscovite on its refringence*. Труд. Петр. Инст. Акад. Наук СССР (Trav. Inst. Pétrogr. Acad. Sci. URSS), 1936, nos. 7-8, pp. 17-24, 3 figs. (Russian with English summary.)

The considerable reduction of the refractive index of muscovite after grinding is explained by the combined effect caused by the absorbed water and by newly formed inner cavities.

S. I. T.



[LAEMMLEIN (G. G.)] Леммлейн (Г. Г.). О двойном лучепреломлении в шаре из кальцита.—LAEMMLEIN (G.). *Sur la double réfraction dans la sphère de calcite*. Труды Ломоносов. Инст. Геохим. Крист. Мин., Акад. Наук СССР (Trav. Inst. Lomonossoff Géochim. Cr. Min., Acad. Sci. URSS), 1935, no. 6, pp. 27–31, 4 figs. (Russian with French summary.)

An elegant method of observing double refraction in a sphere of Iceland-spar is described. S. I. T.

[ZAVARITZKY (A. N.)] Заварицкий (А. Н.). К определению двойного преломления минералов.—ZAVARITSKY (A. N.). *On the determination of the birefringence of minerals*. Труд. Петр. Инст. Акад. Наук СССР (Trav. Inst. Pétrogr. Acad. Sci. URSS), 1936, nos. 7–8, pp. 7–15, 7 figs. (Russian with English summary.)

A certain error in the determination of the birefringence by means of a compensator is due to the dispersion of the mineral and that of the compensator. The value of this dispersion is calculated for certain minerals and corrected formulae are given. S. I. T.

MÉLON (J.) & BAILLY (R.). *Détermination de la biréfringence d'un uniaxe en lumière convergente*. Mém. (in-4°) Roy. Acad. Belgique, Sci., 1937, ser. 2, vol. 11, no. 3, 13 pp., 4 pls., 2 text-figs.

Formulae and graphs are given for determining the birefringence of uniaxial crystals cut perpendicularly or obliquely to the optic axis. L. J. S.

LIETZ (Joachim). *Ein Verfahren zur Unterscheidung der schnelleren und langsameren Welle in dicken Kristallplatten*. Zeits. Krist., 1936, vol. 97, p. 122.

The crystal plate is inserted in the diagonal position in a polarizing microscope fitted with a spectroscope. The nature of the double refraction is then determined by inserting the thick end of a quartz wedge and noticing whether the number of dark bands in the spectrum increases or diminishes. H. S.

BORGSTRÖM (L. H.). *Die Bestimmung der Doppelbrechung von Mineralen in konvergenten Licht*. Soc. Sci. Fennica, Comm. Physico-Math., 1935, vol. 8, no. 18, 15 pp., 7 figs.

The birefringence of a crystal can be calculated from the angular separation of the rings of the interference-figure and the thickness of the section. Formulae are given, and for uniaxial crystals a table. L. J. S.

KÁDECKY-KARDOSS (Elemér). *A ferde megvilágítás néhány hatásáról párhuzamos poláros fényben.* [Some effects of oblique illumination with parallel polarized light.] Mat. Term.-tud. Értesítő, Budapest, 1938, vol. 57, pp. 380-388. (Hungarian.)

A method is given for the determination of the exact optical orientation of very small mineral grains, using oblique illumination with parallel polarized light. It is also shown that the measurement of the relative retardation may be erroneous if employing oblique parallel light on thin sections perpendicular to a bisectrix. V. Z.

SMITH (Harold T. U.). *Simplified graphic method of determining approximate axial angle from refractive indices of biaxial minerals.* Amer. Min., 1937, vol. 22, pp. 675-681, 1 fig.

With a scale of refractive indices laid on a graph a direct reading is given of the optic axial angle and sign. This is useful as a quick check on the consistency of optical data. L. J. S.

NE (J. H., Jr.) & SMITH (H. T. U.). *Graphic method of determining optic sign and true axial angle from refractive indices of biaxial minerals.* Amer. Min., 1938, vol. 23, pp. 457-400, 1 pl., 1 text-fig.

A scale of refractive indices is laid across a graph. L. J. S.

NE (R. von). *A method for estimating the finishing birefringence colour of a crystal of random orientation in a thin section.* Amer. Min., 1937, vol. 22, pp. 926-928, 1 fig.

In order to estimate the birefringence-colour in a section of standard thickness, the thicknesses and colours are determined at two stages of grinding the section and the results plotted on a graph. L. J. S.

URKE (T. T.). *Direct projection of optic figures.* Amer. Min., 1938, vol. 23, pp. 595-605, 5 figs.

Sheets of ground glass or celluloid, marked with scales, are placed over a polaroid plate on top of the crystal on the microscope stage in convergent light. A direct reading is made of the optic axial angle  $2E$ . With a slab of uranium glass the interference-figure is shown in three dimensions. L. J. S.

WEHR (H. E. v.). *Umwandlung  $\alpha = \beta$ -Quarz.* Zeits. Krist., 1938, vol. 99, pp. 292-313, 9 figs.

The double refraction of quartz perpendicular to the optic axis and optical phenomena parallel to the axis were photographed for a range

of 4° C. near the temperature of the change of  $\alpha$ - into  $\beta$ -quartz. It was found that two modifications of quartz exist between  $\alpha$ - and  $\beta$ -quartz, of which the one corresponding to the lower temperature is probably biaxial.

H. S.

TOUSEY (Richard). *Optical constants of fluorite in the extreme ultraviolet*. Physical Rev. (Amer. Physical Soc.), 1936, ser. 2, vol. 50, pp. 1066–1068, 3 figs.

The reflecting power of polished fluorite surfaces was measured at wave-lengths 1605–927 Å. at different angles of incidence, and curves for the refractive index and extinction coefficient calculated.

L. J. S.

WILLEMS (H. W. V.). *On the relation between the optical properties and chemical composition of glaucophane*. Proc. K. Akad. Wetensch. Amsterdam, 1937, vol. 40, pp. 720–724, 5 figs.

Published analyses of glaucophane cannot be interpreted as mixtures of the end-members  $\text{Na}_2\text{Mg}_3\text{Al}_2\text{Si}_8\text{O}_{22}(\text{OH},\text{F})_2$  (glaucophane) and  $\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$  (tremolite), and the corresponding iron compounds (riebeckite and actinolite). Optical data plotted against various oxidation ratios show that, besides Fe and Mn, some influence is exerted by

L. J. S.

MOTT (N. F.). *On the absorption of light by crystals*. Proc. Roy. Soc. London, Ser. A, 1938, vol. 167, pp. 384–391, 3 figs.

The mechanism of the absorption of light by solids is discussed from a theoretical point of view. The energy may be converted into heat, emitted as fluorescent radiation, or used in producing a photoelectric current.

L. J. S.

BEREK (Max). *Optische Meßmethoden im polarisierten Auflicht insonderheit zur Bestimmung der Erzminerale, mit einer Theorie der optisch absorbierenden Kristalle*. Erster Teil: *Mikroskopische Methoden am senkrechten Lichteinfall*. Fortschr. Min. Krist. Petr., 1937, vol. 1, pp. 1–103, 38 figs.

A connected account of the reflection and absorption of light by opaque crystals, with mathematical treatment and particulars of apparatus for the examination of ore-minerals. [M.A. 5–122, 123; 6–69.]

L. J. S.



EST (C. D.). *Crystallography of herapathite*. Amer. Min., 1937, vol. 22, pp. 731-735, 2 figs.

Herapathite,  $4\text{QuH}_2\cdot 3\text{SO}_4\cdot 2\text{I}\cdot \text{I}_n\cdot 6\text{H}_2\text{O}$ , where Qu is quinine

$\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2$ , and  $n = 4, 5, 6, 7$ ,

forms a series of isostructural orthorhombic crystals. These, up to 1 cm. across, are thin rectangular plates on (100) sometimes elongated along  $b$ -axis. Brown crystals ( $d\ 1.645$ ) gave  $a:b:c = 2.2020:1:1.2679$ , and another lot of brown crystals gave  $a:b:c = 2.2515:1:1.2679$ . Small green crystals ( $d\ 1.700$ ) gave  $b:c = 1:1.268$ . No chemical analyses were made. X-ray measurements on the first lot of brown crystals gave  $a\ 13.30$ ,  $b\ 15.15$ ,  $c\ 19.24\ \text{\AA}$ ., with four molecules in the unit cell. Optical plane  $\perp$  (100),  $\text{Bx}_a = \gamma - c$ ,  $2V$  about  $10^\circ$ ,  $\alpha\ 1.608$ ,  $\beta\ 1.625$ ;  $\gamma$  is almost completely absorbed, and on this depends the use of the material for large polarizing sheets ('polaroid', 'herotar', &c.). [M.A. 6-461.]

L. J. S.

FRANK (Frances G.). *Über Tribolumineszenz*. Sitz.-ber. Akad. Wiss. Wien., Math.-nat. Kl., Abt. II a, 1936, vol. 145, pp. 689-705.

— *An experimental study of the triboluminescence of certain natural crystals and synthetically prepared materials*. Journ. Opt. Soc. Amer., 1937, vol. 27, pp. 275-285. [Translation of the German paper.]

Fluorite when crushed in a mortar or pressed in a vice gives a green luminescence, the spectrum of which shows the same rare-earth (Tb and Eu) bands as the thermoluminescence spectrum. This triboluminescence is intensified after the specimen has been exposed to radium or thorium. Similar effects were obtained with artificial  $\text{CaF}_2$  containing small amounts of rare-earths, and with  $\text{CaCO}_3$ , &c., containing manganese. Other triboluminescent minerals are calcite, apatite, chalcedony, quartz, halite, feldspar, blende, and willemite. [M.A. 4-211, 212.]

L. J. S.

ORI (Satoyasu) & YOSHIMURA (Jun). *The cathodo-luminescence spectrum of danburite*. Sci. Papers Inst. Phys. Chem. Research, Tokyo, 1937, vol. 31, pp. 225-228, 1 fig.

The colourless crystals of danburite from Obira give a beautiful reddish-yellow thermoluminescence, and are remarkably fluorescent in ultraviolet rays. The spectrum of the latter shows some bands corresponding with those of europium and praseodymium, and also some corresponding with boron oxide.

L. J. S.

IWASE (Ei-ichi). *Luminescence of scapolite from North Burgess, Canada*. Sci. Papers Inst. Phys. Chem. Research, 1937, vol. 33, pp. 299-305, 5 figs.

Small (1 mm.) crystals of scapolite in a matrix of quartz, pyrrhotite, calcite, sphene, and diopside have  $\omega$  1.558,  $\epsilon$  1.543 (corresponding to  $\text{Me}_{36}\text{Ma}_{64}$ ) and sp. gr. 2.66 ( $\text{Me}_{42}\text{Ma}_{58}$ ). Those in the portion of matrix rich in quartz show a brilliant yellow fluorescence in ultra-violet rays, whilst those more closely associated with pyrrhotine show no fluorescence. The fluorescent spectrum shows lines between the orange and yellowish-green, suggesting the presence of uranium. L. J. S.

IIMORI (Satoyasu) & IWASE (Eiichi). *The fluorescence spectrum of autunite*. Sci. Papers Inst. Phys. Chem. Research, Tokyo, 1938, vol. 33, pp. 372-376, 1 pl.

Autunite ( $n$  1.57) from a felspar quarry at Ōkuma, Fukushima, Japan, shows an intense yellowish-green fluorescence in ultra-violet rays. A series of 16 bands at 605-504  $\mu\mu$  is nearly the same as with sodium uranyl acetate. A weak fluorescence is also produced by exposure to visible light: in blue light 5 bands at 605-504  $\mu\mu$ , and in green light 1 band at 577  $\mu\mu$ . Torbernite ( $n > 1.605$ ) from the same locality shows no fluorescence. L. J. S.

IWASE (Ei-ichi) & IIMORI (Satoyasu). *The cathodo-luminescence of luminescent calcium silicate*. Sci. Papers Inst. Phys. Chem. Research, Tokyo, 1938, vol. 34, pp. 173-181, 3 figs.

The intense yellow luminescence of wollastonite when excited by cathode rays shows a spectrum of two bands with maxima at 580 and 630  $\mu\mu$ . It is due to the presence of manganese. Specimens from Japanese localities contain 0.4-0.9% Mn. Artificial wollastonites, either pure or with small amounts of Fe, Zn, Al, Mg, Cu, Pb, &c., or with less than 0.2% Mn, show only a faint bluish-white luminescence; but with 0.4-0.9% Mn the yellow luminescence is produced. Pectolite and ordinary glass are also luminescent with a broad band about 580  $\mu\mu$  in addition to Na lines. Pectolite from Japan contains 0.2% Mn, and on prolonged exposure to cathode rays it turns violet. L. J. S.

BROWN (W. L.). *Luminescence of minerals*. Univ. Toronto Studies in Geol. Ser., 1937, no. 40, pp. 155-156.

A summary of a Ph.D. thesis and of previous papers [M.A. 5-6-72] with further notes on photo-phosphorescence. L. J. S.

ITH (Edward S. C.) & PARSONS (William H.). *Studies in mineral fluorescence*. Amer. Min., 1938, vol. 23, pp. 513-521.

Several minerals were examined for fluorescence in ultra-violet rays of different wave-lengths (4358-2652 Å.). A monochromator with quartz prisms of silica-glass was used. In a few cases a different colour of fluorescence was given with different wave-lengths: e.g. calcite from Big Bend Mts., Texas, pink with 4047 and 3650 Å., and blue with 3128-3142 Å.

L. J. S.

SZCZYNSKI (S. von) & STOICOVICI (E.). *Fluoreszenz- und Phosphoreszenzerscheinungen an aragonitartigen Calciten von Corund (Rumänien)*. Zeits. Krist., 1937, vol. 98, pp. 344-350.

Eighty-eight pieces of calcite from Corund, Transylvania, were exposed to ultra-violet and Röntgen-ray radiation and the nature of the visible light emitted by them during and after exposure was noted.

H. S.

REMBÉRE (Maurice). *Les minéraux luminescents: les composés naturels du zinc*. Ann. (Bull.) Soc. Géol. Belgique, 1938, vol. 61, pp. B 104-B 108.

The character and intensity of the fluorescence shown by artificial zinc minerals in ultra-violet rays vary with the mode of preparation of the mineral; and with artificial willemite only a trace of manganese is needed to give a good result. Various zinc minerals give variable results. Zincite rarely shows a feeble fluorescence. A blende from Tsounes, Georgia, shows a brilliant orange. [Min. Mag. 21-394.]

L. J. S.

### Instruments and Apparatus.

ATKY (O.). *Ein neuer Goniometerkopf für die röntgenographische Einkristalluntersuchung*. Zeits. Krist., 1936, vol. 95, pp. 457-459, 2 figs.

The author describes a crystal-holder for the use of goniometric X-ray work by means of which the crystal can be rotated through any angle without detaching it from the wax.

H. S.

(S. H.). *Theory and design of the cam of an oscillating crystal X-ray spectrophotograph*. Zeits. Krist., 1937, vol. 96, pp. 1-6, 2 figs.

$O$  and  $A$  are fixed points at a distance  $a$  apart and the curve with the equation  $r = 2a \sin n\theta$  rotates with uniform angular velocity about the pole  $O$ , meeting a fixed circle with centre  $O$  and radius  $a$  at  $P$ , and the angular velocity of  $AP$  is constant. This theorem is applied to

the problem of converting the uniform rotation of a motor into oscillation with constant angular velocity of a goniometer head carry a crystal. H. S.

SCHOßBERGER (F.). *Eine Präzisions-Pulverkamera für Aufnahmen hohen Temperaturen und ein Meßgerät für Röntgendiagramme*. Zeits. Krist., 1937, vol. 98, pp. 259-265, 4 figs.

A description is given of apparatus enabling powder photographs be taken at high temperatures and of a device for measuring X-ray photographs, which can be made easily and cheaply by any laboratory mechanic. H. S.

[Вокү (G. B.)] Бокій (Г. Б.). Методика определения оптических констант кристаллов в петрографических препаратах на втором модели универсального столика А. В. Шубникова.—Вокү (G. B.) *Methodik der Bestimmung optischer Konstanten der Kristalle an petrographischen Präparaten auf dem zweiten Modell von Schubnikows Universaldrehtisch*. Труды Ломоносов. Инст. Геол. Крист. Мин., Акад. Наук СССР (Trav. Inst. Lomonos. Géochim. Crist. Min., Acad. Sci. URSS), 1933, no. 3, pp. 29-33, 13 figs. (Russian with German summary.)

The universal stage of Shubnikov and the methods of work are described. The stage consists of a lower large glass hemisphere sliding in a socket and a smaller upper glass hemisphere. The position of optical directions in the measured crystal are marked with a pencil on the ground surface of the lower hemisphere and in this way simplification is achieved. S. I. S.

[ARSHINOV (V. V.)] Аршинов (В. В.). О стеклянных полусферах для кристаллооптических измерений на поляризационном микроскопе.—ARSHINOV (V. V.). *On glass hemispheres for the petrological microscope*. Труды Инст. Прикл. Мин. (Trans. Inst. Econ. Min.), 1934, no. 65, 50 pp., 23 figs. (Russian with English summary.)

A number of universal stage models are described. The advantages claimed are those of cheapness and simplicity of construction and operation. S. I. S.

CLARK (G. L.) & GROSS (S. T.). *A new type of gnomonic ruler*. Science, New York, 1937, n. ser., vol. 86, pp. 272-273, 1 fig.

A bent arm pivoted on a straight-edge enables gnomonic projections to be drawn from Laue patterns. L. J. S.



LACHLAN (Dan). *Mechanical method for drawing pole-figures*. Zeits.

Krist., 1936, vol. 94, pp. 500-505, 3 figs.

Describes an apparatus for drawing a stereographic projection directly from a print of an X-ray diffraction pattern.

L. J. S.

ARŠINOV (V. V.) [ARŠINOV (V. V.)]. *On the pocket mineralogical or polarizing magnifier*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1937, vol. 17, pp. 33-34, 1 fig.; Amer. Min., 1938, vol. 23, pp. 287-290, 1 fig.

A graduated disk with polaroid disks [M.A. 6-461] on either side is combined with a magnifying lens. Extinction-angles and optic axial angles can be measured.

L. J. S.

BERSON (Earl). *Accurate orientation of thin sections*. Amer. Min., 1937, vol. 22, pp. 760-772, 8 figs.

A holder and measuring device are described for the orientation of thin sections of rocks for petrofabric analysis.

L. J. S.

ISHER (D. Jerome) & STEVENS (E. H.). *Building nuclear crystal structure models*. Amer. Min., 1937, vol. 22, pp. 268-278, 4 figs.

The models are made with links of wire and small balls of plastic wood. Detailed instructions are given for constructing models of the cordierite and muscovite structures.

L. J. S.

WIRTH (Harold T. U.). *Models to aid in visualizing the optical properties of crystals*. Amer. Min., 1938, vol. 23, pp. 629-643, 12 figs.

Using celluloid sheets 0.08 and 0.125 inch thick, transparent models of the optical indicatrix of uniaxial and biaxial crystals, models showing vibration-directions, ray surfaces, &c., can readily be constructed for teaching purposes [and museum exhibits].

F. A. B.

### Miscellaneous.

НИКОГОСЯН (K. S.) [НИКОГОСЯН (X. C.)]. Физико-химическое исследование нонтронита. [*Physico-chemical investigation of nontronite*.]

Труд. Второго Сов. Экспер. Мин. Петр., 7-10 мая 1936 г., Акад. Наук СССР [Trans. Second Confer. Exper. Min. Petr., 7-10 May 1936, Acad. Sci. USSR], 1937, pp. 59-64, 3 figs.

Two samples of nontronite are studied: (1) from St. Andreasberg, Erzgeb. (anal. I),  $\alpha$  1.569,  $\gamma$  1.573, 2V small, negative, straight extinction [M.A. 6-141]; (2) from Magnitogorsk, Urals (anal. II),  $\alpha$  1.571,  $\gamma$  1.575, 2V small, negative, straight extinction. Thermal curves for nontronite

give two endothermal stops at 50–150° and at 400–500° C., corresponding to the loss of water of crystallization and of constitutional water respectively. The dehydration and the thermal curves suggest the formula  $\text{Fe}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot \text{H}_2\text{O} \cdot 4\text{H}_2\text{O}$  for nontronite.

	$\text{SiO}_2$	$\text{Al}_2\text{O}_3$	$\text{Cr}_2\text{O}_3$	$\text{Fe}_2\text{O}_3$	$\text{FeO}$	$\text{MgO}$	$\text{CaO}$	$\text{Na}_2\text{O} + \text{K}_2\text{O}$	$\text{CO}_2$	$\text{H}_2\text{O} \pm$	Tot.
I.	38.53	2.27	nil	33.75	0.19	0.29	3.60	trace	nil	21.57	100
II.	42.22	3.20	—	32.35	0.15	2.15	2.32	trace	nil	17.75	100

S. I. T.

DOLAR-MANTUANI (L.) & GAGARIN (Gr.). *Tremolite aus dem Pohorje-Gebirge (Bachern).—Tremoliti sa Pohorja*. Геол. Анал. Балкан. Полуострва (Ann. Géol. Péninsule Balkan.), 1936, vol. 13, pp. 64–69 (German), pp. 70–71 (Croatian).

Greenish-grey crystals (1 cm.) in marble from the Dovžanka stre gave  $\gamma-\alpha$  0.0241,  $\gamma:c = 16^\circ$ , 2V  $83^\circ$ , and analysis by S. Lebedev S 55.20,  $\text{TiO}_2$  0.25,  $\text{Al}_2\text{O}_3$  4.60,  $\text{Fe}_2\text{O}_3$  0.49,  $\text{FeO}$  1.91,  $\text{MgO}$  21.65,  $\text{CaO}$  13.2,  $\text{Na}_2\text{O}$  1.29,  $\text{K}_2\text{O}$  0.64,  $\text{H}_2\text{O} + \text{F}$  0.86,  $\text{P}_2\text{O}_5$  0.02 = 100.19; sp. gr. 2.996. Formula  $(\text{Ca}, \text{Na}, \text{K})_{2.2}(\text{Mg}, \text{Fe}, \text{Al}, \text{Ti})_5(\text{Si}, \text{Al})_8(\text{O}, \text{OH}, \text{F})_{24}$ . Tremolite in marble from Planica gave  $\gamma-\alpha$  0.0277,  $\gamma:c = 16^\circ$ , 2V  $82\frac{1}{2}^\circ$ .

L. J. S.

GAGARIN (Gr.). *Nekoliko hemiskih analiza naših karbonata.—Several analyses of the carbonates of Jugoslavia*. Геол. Анал. Балкан. Полуострва (Ann. Géol. Péninsule Balkan.), 1936, vol. 13, pp. 72–77 (Croatian), p. 78 (English).

I, Calcite from the Zajača antimony mine, Podrinje; previously described as strontianite, but contains no trace of strontium. II, Calcite (sideroconite) from Brezovac, Arandjelovac; the yellowish-brown color is due to enclosed limonite. III, Zinc-manganocalcite from Trepča mine, Kosovska Mitrovica; on quartz and blende. IV, Rhodochrosite from Trepča mine; with quartz, blende, pyrite, and arsenopyrite. V, Aragonite, radially fibrous, from hot springs at Ilidža, Sarajevo.

	$\text{CO}_2$	$\text{Al}_2\text{O}_3$	$\text{Fe}_2\text{O}_3$	$\text{FeO}$	$\text{MnO}$	$\text{MgO}$	$\text{CaO}$	$\text{H}_2\text{O}$	Insol.	Total
I.	43.66	0.25	—	—	—	0.24	55.79	—	0.22	100
II.	42.93	0.88	1.15	—	trace	0.16	54.67	0.47	0.30	100
III.	42.24	2.77	—	2.15	3.71	0.42	48.32	—	0.14	100
IV.	34.70*	10.02	—	6.17	42.97	1.43	4.73	—	0.08	100
V.	44.22	0.32	—	—	—	0.12	54.81	0.22	0.30	100

II, also  $\text{Na}_2\text{O}$  trace. III, also  $\text{ZnO}$  0.78. IV, also  $\text{BaO}$  0.03,  $\text{Li}_2\text{O}$  trace, \* loss on ignition. V, also  $\text{SrO}$  0.30,  $\text{Na}_2\text{O}$  trace.

L. J. S.

GAGARIN (G.) & PAVLOVICH (S.) Гагарин (Гр.) и Павлович (Ст.). Бурнонит из Трепче.—GAGARIN (Gr.) & PAVLOVIČ (St.). *Bournonite from Trepča mine, Yugoslavia*. Геол. Анал. Балкан. Полуострва (Ann. Géol. Péninsule Balkanique), 1937, vol. 14, pp. 199–200 (Serbian), p. 201 (English).

Short-prismatic wheel-shaped twins of bournonite have been found in a single specimen from the Trepča mine near Kosovska Mitrovica, Serbia, associated with pyrrhotine altered to pyrite, blende, arsenopyrite, quartz, and rhodochrosite. Crystal-forms *c a b m o n y*. Analysis gave S 20.40, Sb 22.22, As 0.03, Pb 43.62, Cu 12.95, Fe 0.74, Ni trace, Zn 0.38, total 100.34.

L. J. S.

HERTSCH (H.). *Beobachtungen an Chiasolith-Kristallen*. Min. Petr. Mitt. (Tschermak), 1937, vol. 49, pp. 31–41, 4 figs.

The enclosed impurities marking the cross pattern are accumulated in pyramids of growth from the basal planes and along the prism edges. Exception is taken to the idealized figure given by Dana (5th edit., pp. 343–345; 6th edit., p. 497, fig. 6), which would imply a hemimorphic development.

L. J. S.

КОВ (J.). *Ueber den Alkaligehalt der Disthene*. Schweiz. Min. Petr. Mitt., 1937, vol. 17, pp. 214–219.

Analyses of kyanite from I and II the kyanite-staurolite-schist of the Sponda, Pizzo Forno, Tessin, and III from the dolomite of Campo Tigo, Tessin, give a formula  $40\text{Al}_2\text{SiO}_5 \cdot 1\text{Na}_2\text{O} \cdot 1-3\text{H}_2\text{O}$ . It is suggested that the stability of polymorphous substances may be helped by the presence of small amounts of other substances.

	SiO <sub>2</sub> .	Al <sub>2</sub> O <sub>3</sub> .	Fe <sub>2</sub> O <sub>3</sub> .	Na <sub>2</sub> O.	K <sub>2</sub> O.	H <sub>2</sub> O+.	H <sub>2</sub> O—.	Total.	Sp. gr.
I.	37.02	61.19	0.55	0.87	0.20	0.28	0.00	100.11	3.576
II.	36.21	62.12	0.33	0.72	0.20	0.57	0.00	100.15	3.648
III.	37.21	60.80	0.33	0.78	0.32	0.83	0.08	100.35	3.527

L. J. S.

PAHLSTROM (Ernest E.). *Octahedral parting on galena from Boulder County, Colorado*. Amer. Min., 1937, vol. 22, pp. 906–911, 2 figs.

Galena aggregates from one vein at Camp Albion show excellent, closely-spaced parting planes parallel to the octahedron, without any indication of cubic cleavage. Analysis gave Pb 81.92, Bi 1.36, Zn 1.19, S 0.22, S (calc.) 13.53, Te 0.45, insol. 1.30 = 99.97, corresponding to  $(\text{S,Te})_3$  2.15%. On polished and etched sections tetradyomite shows white lines parallel to the octahedral planes. These layers have

evidently been formed by exsolution, and they are the cause of the octahedral parting. When the material is heated in a closed tube this part is lost and the cubic cleavage appears. Specimens from another vein show the ordinary cubic cleavage, but they also contain Bi 1.12, 0.41%, and show the tetradymite lines parallel to the octahedron in polished sections. L. J. S.

NEUHAUS (A.). *Über Pyrit mit vollkommener Teilbarkeit nach {111} (Anomale Mischkristalle III. Beitrag.)* Chem. Erde, 1938, vol. 1, pp. 23–41, 14 figs. [Cf. M.A. 4–301.]

Pyrite surrounded by blende fills druses in granite from Naundorf near Freiberg, Saxony. The grains show a perfect separation parallel to the octahedral faces, and in thin section are seen to consist of a lamellar intergrowth of pyrite and blende. Minute crystals of pyrite and blende and of blende on pyrite are oriented with parallel cubic axes, lattice dimensions being nearly the same in the two minerals. L. J. S.

AGAR (William M.) & EMENDORFER (Earl H.). *Manganiferous prochlorite from Hawleyville, Conn.* Amer. Journ. Sci., 1937, ser. 5, vol. 35, pp. 77–80.

Veins of pink albite with bunches of dark-green chlorite occur in granitized sediments. The chlorite shows unusual reddish-brown interference tints;  $\alpha$  and  $\beta$  1.626,  $\gamma$ — $\alpha$  about 0.003;  $\text{SiO}_2$  25.1,  $\text{TiO}_2$  1.7,  $\text{Al}_2\text{O}_3$  21.7,  $\text{Fe}_2\text{O}_3$  3.4,  $\text{FeO}$  24.7,  $\text{MnO}$  0.4,  $\text{MgO}$  14.6,  $\text{CaO}$  0.1,  $\text{Na}_2\text{O}$  0.1,  $\text{K}_2\text{O}$  0.1,  $\text{H}_2\text{O}+$  10.2,  $\text{H}_2\text{O}-$  0.1 = 100.6, sp. gr. 2.98. The albite ( $\text{Ab}_{93}$ ) has  $\alpha$  1.527,  $\gamma$  1.537,  $\alpha:(001) = 16^\circ$ ;  $\text{SiO}_2$  65.45,  $\text{Fe}_2\text{O}_3$  0.1,  $\text{MnO}$  0.03,  $\text{CaO}$  0.9%. L. J. S.

GLASS (Jewell J.) & FAHEY (Joseph J.). *Graftonite from Greenough, Maine.* Amer. Min., 1937, vol. 22, pp. 1035–1039.

This is the third locality [M.A. 3–203] to be recorded for graftonite [M.A. 3–360]. Massive ochre-salmon coloured material from pegmatite shows cleavages and optical characters indicating monoclinic symmetry. Sp. gr. 3.796, H. 4–5,  $\alpha$  1.709,  $\beta$  1.714,  $\gamma$  1.733,  $2V$   $55^\circ$ , positive. Analysis:  $\text{P}_2\text{O}_5$  40.03,  $\text{FeO}$  27.78,  $\text{MnO}$  25.48,  $\text{CaO}$  4.71,  $\text{Na}_2\text{O}$  0.16,  $\text{K}_2\text{O}$  0.1,  $\text{Li}_2\text{O}$  0.37,  $\text{H}_2\text{O}$  0.60,  $\text{CaCO}_3$  0.46, insol. 0.18 = 99.82, agrees with  $3(\text{Fe,Mn,Ca})\text{O} \cdot \text{P}_2\text{O}_5$ . More MnO and less CaO are shown than in previous analyses. L. J. S.

PARDEE (J. T.), GLASS (Jewell J.), & STEVENS (R. E.). *Massive fluorine topaz from Brewer mine, South Carolina.* Amer. Min., 1937, vol. 22, pp. 1058–1064.



A gold-bearing lode of fine-grained quartz with pyrite, &c., in quartzite-schist near granite, in Chesterfield Co., grades into fine-grained topaz with very much the same appearance as the quartz, and hitherto mistaken as such. Material consisting almost exclusively of very fine-grained topaz, with the texture of chert and breaking into angular blocks, is exposed over an area of  $50 \times 25$  feet. This has sp. gr. 3.509,  $d_{100} 3.499$ ,  $n 1.631$ , and gave  $\text{SiO}_2$  33.00,  $\text{Al}_2\text{O}_3$  56.76,  $\text{Fe}_2\text{O}_3$  trace,  $\text{H}_2\text{O} + 2.67$ ,  $\text{H}_2\text{O} - 0.04$ , F 13.23, total (less O for F) 100.13. This is the lowest F and highest  $\text{H}_2\text{O}$  on record. Topaz is disseminated as minute grains in the quartz vein, and material from a rather coarser grained intermediate type gave the following optical data I (compared with high-refractive topaz from Utah, II, Penfield and Minor, 1894).

	$\alpha$ .	$\beta$ .	$\gamma$ .	$\gamma - \alpha$ .	2V.	Sp. gr.	$\text{H}_2\text{O}$ .	F.
I.	1.629	1.631	1.638	0.009	$48^\circ$	3.509	2.67	13.23
II.	1.607	1.610	1.618	0.011	67	3.565	0.19	20.33

L. J. S.

ARTH (Tom. F. W.). *Crystallographic studies in the vivianite group*.

Amer. Min., 1937, vol. 22, pp. 325-341, 4 figs.

Chemical measurements are given for erythrite ( $d$  3.182) from Annaberg, Saxony, and annabergite ('cabrerite') from Laurion, Greece, but the axial ratios from the X-ray data are considered to be more accurate. X-ray data are also given for vivianite ( $d$  2.711) from Montecatini mine, Bolivia, and for bobierrite. The unit cell is adapted to the crystallographical data. Optical data are given for these minerals and for some artificial products of the same group. The optic axial plane is (010) for all except bobierrite, in which, contrary to previous statements,  $\beta = b$ . Hautefeullite is probably identical with bobierrite, and cabrerite with annabergite.

	$a$ .	$b$ .	$c$ .	$\beta$ .	$a:b:c$ .
vivianite...	10.039	13.388	4.687 Å.	$75^\circ 42'$	0.7499:1.0:7002
annabergite	10.122	13.284	4.698	75 15	0.7619:1.0:7073
erythrite	10.184	13.340	4.730	74 59	0.7634:1.0:7092
bobierrite	9.946	27.654	4.639	75 59	0.7193:1.0:6671

	$\alpha$ .	$\beta$ .	$\gamma$ .	$\gamma:c$ .	Sp. gr.
annabergite	—	1.651	1.689	$30^\circ$	—
cabrerite...	—	1.650	1.688	36	3.231
$\text{As}_2\text{O}_8 \cdot 8\text{H}_2\text{O}$	—	1.655	1.688	32	—
bobierrite	1.510	—	1.543	30	2.169
$\text{P}_2\text{O}_8 \cdot 8\text{H}_2\text{O}$	1.510	—	1.543	30	—
$\text{As}_2\text{O}_8 \cdot 8\text{H}_2\text{O}$	—	1.570	1.594	45	—

L. J. S.

HARCOURT (G. Alan). *The distinction between enargite and famatinite (luzonite)*. Amer. Min., 1937, vol. 22, pp. 517-525, 4 figs.

A micro-drill is described for excavating under the microscope minute amounts of material from polished ore sections. The material is then used for X-ray powder photographs and spectrographic analysis. Polished sections of enargite and famatinite both show a granular intergrowth of grey and pink material, the grey richer in arsenic and the pink richer in antimony; but there appears to be a gap in the series  $\text{Cu}_3\text{AsS}_4$ — $\text{Cu}_3(\text{As},\text{Sb})\text{S}_4$  (enargite) to  $\text{Cu}_3(\text{Sb},\text{As})_4$ — $\text{Cu}_3\text{SbS}_4$  (famatinite) and further the X-ray patterns of these are distinct. Although luzonite is said to be richer in arsenic, it shows the famatinite pattern, and it is no doubt identical with this. The X-ray patterns (zinc-blende type) of germanite [M.A. 4-270] and of colusite [M.A. 5-388] also show a resemblance to that of famatinite (although this is strongly anisotropic) while that of enargite [M.A. 6-39] is of the wurtzite type.

L. J. S.

FOSHAG (W. F.). *Carminite and associated minerals from Mapimi, Mexico*. Amer. Min., 1937, vol. 22, pp. 479-484.

Minute crystals of carminite occur in cavities in massive scorodite from the Ojuela mine, Mapimi, Durango. They form sheaf-like aggregates of orthorhombic blades with  $a:b:c = 0.7373:1:0.4663$ ;  $\alpha$  2.070,  $\beta$  2.070,  $\gamma$  2.080; pleochroism strong,  $\alpha$  pale yellowish-red,  $\beta$  and  $\gamma$  dark carmine. Analysis I, and II of carminite from an unknown locality in Colorado give the new formula  $2\text{FeAsO}_4 \cdot \text{Pb}(\text{OH})_2$ . Scorodite forms coarse crystalline masses with crystals in cavities, or compact concretionary masses;  $\alpha$  1.787,  $\beta$  1.795,  $\gamma$  1.810; anal. III. Arseniosiderite forms chestnut-brown veinlets in massive scorodite, or sharp pseudomorphs after crystals of scorodite; anal. IV, after deducting a little carminite and limonite, gives the formula  $3\text{CaO} \cdot 2\text{Fe}_2\text{O}_3 \cdot 2\text{As}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$ , which is the same as that given for mazapilite. It is suggested that mazapilite (G. A. Koenig, 1888) is arseniosiderite pseudomorphous after scorodite. Associated with these secondary minerals is also dussertite [M.A. 2-4] as fine-granular material with pistachio-green colour; optically uniaxial (to 2V 15-20°),  $\omega$  1.870,  $\epsilon$  1.845.

	$\text{As}_2\text{O}_5$	$\text{Al}_2\text{O}_3$	$\text{Fe}_2\text{O}_3$	FeO	PbO	MgO	CaO	$\text{H}_2\text{O}$	Insol.	Total
I.	33.98	0.96	23.43	0.21	37.30	0.06	0.44	3.00	0.58	99.9
II.	34.49	0.43	23.81	0.14	36.57	0.02	0.06	3.13	0.46	99.9
III.	48.96	1.60	34.20	—	—	0.22	0.54	14.53	0.12	100.0
IV.	42.67	—	32.71	0.12	0.28	0.61	14.44	9.34	0.40	100.0

L. J. S.

ERWIN (H. E.) & POSNJAK (E.). *Sulphate incrustations in the Copper Queen mine, Bisbee, Arizona*. Amer. Min., 1937, vol. 22, pp. 567-571, 1 fig.

A crust from the mine walls (the rock of which is minutely impregnated with pyrite), which was formed at 32° C., shows a zonal arrangement with the most acid and least oxidized minerals next the rock and the least acid and most oxidized minerals at the surface of the crust. The minerals present follow the order rhomboclase, coquimbite, voltaite, erite, kornelite, copiapite, chalcantite. The formation of these minerals is discussed in relation to their artificial production under varying conditions of temperature and acidity of the solutions. L. J. S.

HALLER (Waldemar T.). *Crystallography of valentinite ( $Sb_2O_3$ ) and andorite (?) ( $2PbS \cdot Ag_2S \cdot Sb_2S_3$ ) from Oregon*. Amer. Min., 1937, vol. 22, pp. 651-666, 2 figs.

Three specimens from Gold Hill, Ochoco district, Crook Co., show jameelite, 'feather-ore', &c., in a carbonate matrix. Minute crystals of valentinite gave 15 new forms in the prism-zone, but are terminated only by the new dome  $T(0.11.8)$ ;  $a:b:c = 0.3930:1:0.4350$ . A single minute crystal rich in faces gave 13 forms that could be correlated with andorite and 15 with freieslebenite. L. J. S.

SWETT (D. F.) & SCHALLER (W. T.). *Braunite from Mason County, Texas*. Amer. Min., 1937, vol. 22, pp. 785-789.

The ore of the Spiller mine forms lenses in quartzite in Archaean schists, and consists mainly of braunite with some garnet and albite. A new form  $D$  (867) is noted on the braunite crystals [ $a:c = 1:0.9850$ ]. Analysis gave  $SiO_2$  9.90,  $MnO$  66.89,  $O$  6.27,  $Fe_2O_3$  15.39,  $MgO$  0.19,  $CaO$  0.06,  $H_2O$  0.73, insol. 0.67 = 100.10, sp. gr. 4.729; formula,  $(Mn,Fe)_2O_3 \cdot MnSiO_3$ . L. J. S.

MOORE (Charles H. Jr.). *The staurolite area of Patrick and Henry Counties, Virginia*. Amer. Min., 1937, vol. 22, pp. 990-996, 4 figs.

The staurolite occurs in biotite-chlorite-, sericite-staurolite-, and quartz-mica-schists. The crystals enclose about 50% of impurities quartz, garnet, graphite (?), muscovite, biotite, tourmaline, and magnetite, and they are often partly or wholly altered to sericite, chlorite, and albite. L. J. S.



SPIROFF (Kiril). *An unusual occurrence of halite*. Amer. Min., 19 vol. 22, pp. 931-933, 1 fig.

The walls of an old level in the Quincy mine, Hancock, Michigan, the Keweenaw lavas, are thickly encrusted with halite. This has the form of stalactites, stalagmites, capillary crystals (seen on the larger ones to have square terminations), and cubes with octahedral faces. NaCl is present in the mine waters. L. J. S.

DUNHAM (Kingsley C.). *The paragenesis and color of fluorite in the English Pennines*. Amer. Min., 1937, vol. 22, pp. 468-478, 2 figs.

A summary account is given of the mineral veins in the northern, central, and Derbyshire areas, especially the first of these [M.A. 6-36]. A map of the northern area shows the distribution of purple and green fluorite towards the centre of the fluorite zone, and of yellow fluorite often associated with baryte, in the outer portion. Epimorphs of fluorite (casts of crystals) occur in both the oxidation zone and the primary deposits. L. J. S.

ROSS (Clarence S.). *Sphalerite from a pegmatite near Spruce Pine, North Carolina*. Amer. Min., 1937, vol. 22, pp. 643-650, 6 figs.

Large lenticular masses consisting of an intergrowth of black blende and white albite (Ab 95) occur in the pegmatite of a felspar quarry. The albite replaces microcline, and the blende penetrates albite and muscovite. Analysis by J. G. Fairchild gave S 34.11, Zn 59.34, Fe 6.0, Cd 0.23, Mn 0.05, insol. 0.27 = 100.16, sp. gr. 4.070. L. J. S.

SHORT (M. N.). *Etch tests on calaverite, krennerite, and sylvanite*. Amer. Min., 1937, vol. 22, pp. 667-674, 20 figs.

Different results were obtained when oriented sections of crystals were etched with 1:1 nitric acid and with concentrated acid for different periods. These minerals cannot be distinguished with certainty by this method. L. J. S.

MEIXNER (Heinz). *Monazit, Xenotim und Zirkon aus Apatit führenden Pegmatiten des steirisch-kärntnerischen Altkristallins*. Zeits. Krist., 1938, vol. 99, pp. 50-55.

In the old crystalline rocks of the eastern Alps some rare species were found, namely, monazite as small brown grains with good cleavage, brownish translucent tetragonal crystals of xenotime, zircon, &c. H. S.